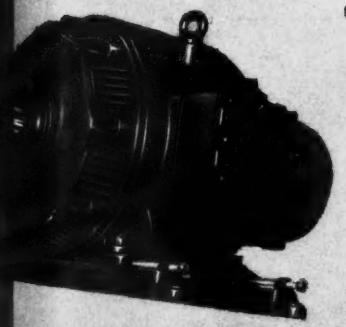
POWER CONVENTION AND EXHIBITION

ELECTRICAL REVIEW

24 JUNE 1955 PRICE 1s 6d



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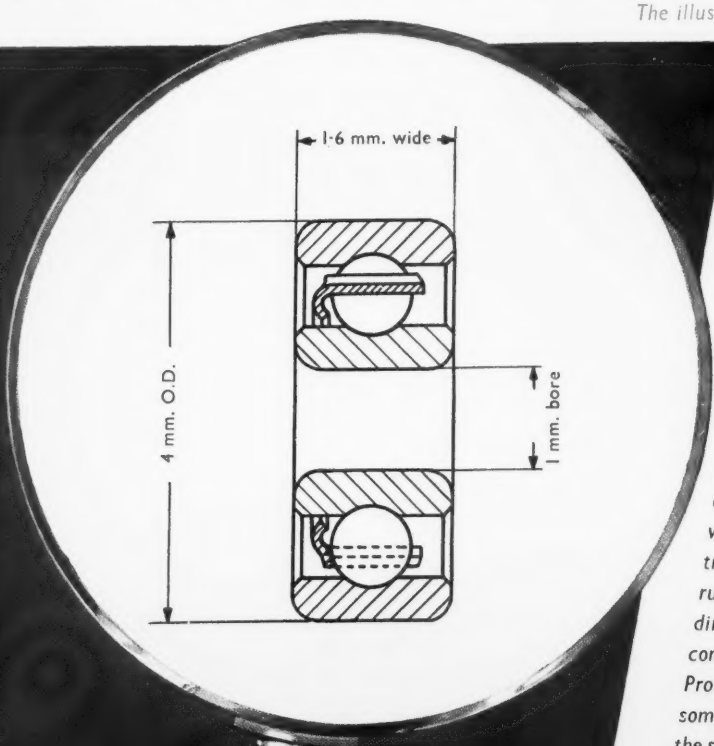

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ELECTRICAL REVIEW

Managing Editor: HUGH S. POCOCK, M.I.E.E.
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24 JUNE 1955

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VOLUME 156 ◇ NUMBER 25

Eighty-Third Year of Publication

FRIDAY ◇ PRICE 1s 6d

201 CLASSIFIED ADVERTISEMENTS
214 INDEX TO ADVERTISERS

Editorial, Advertising and Publishing Offices : Dorset House, Stamford Street, London, S.E.1. Telegraphic Address : "Elecrev, Sedist, London." Code : ABC. Telephone No. Waterloo 3333 (60 lines). Registered at the General Post Office as a Newspaper. Entered as Second Class Matter at the New York, U.S.A., Post Office. Annual Subscription : Home and Overseas £4 10s 0d : U.S.A. and Canada $14.00. Cheques and Postal Orders (on Chief Office, London) payable to ELECTRICAL REVIEW PUBLICATIONS LTD., and crossed "Lloyds Bank."

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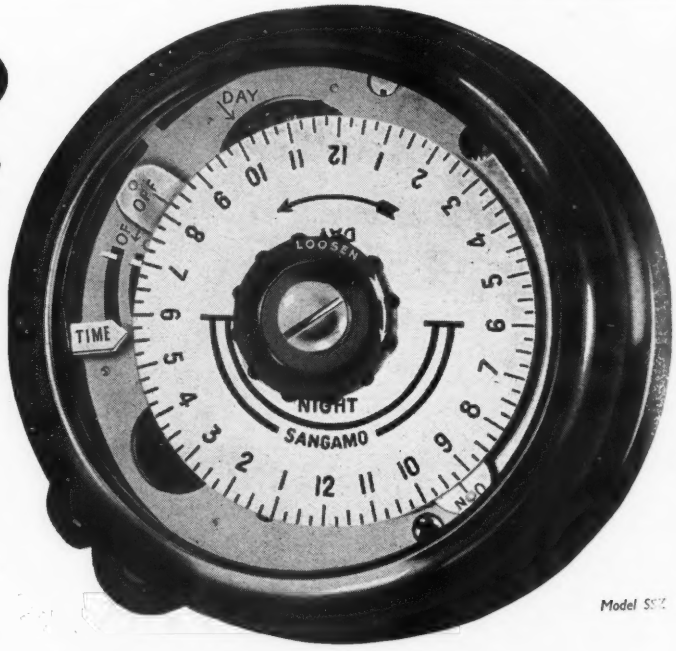

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ELECTRICAL REVIEW

24 June 1955 Vol. 156 No. 25 Established 1872

Electricity and Industry

FOR the seventh British Electrical Power Convention taking place at Brighton next week the theme is " Electricity and the Future." As the nature of the future will depend in many ways upon electricity it might well have been " Electricity Shapes the Future," with particular application to the future of industry.

In one group of Convention papers leading men in three basic industries—coal, steel and chemicals—will show how in various ways their industries depend and react upon the electricity supply industry. All of these industries are spending a great amount of money in the next few years upon modernization and development and a substantial proportion of it must be devoted to electrical equipment and consequently must affect the electricity plant programme. For instance, the National Coal Board is spending on capital account from £90 million to £100 million a year on reconstruction and development. The second development plan of the steel industry (1953–58) is involving an expenditure of £300 million of which £75 million is for handling and treatment equipment for raw materials and blast furnaces and £90 million for mills and steel finishing. Imperial Chemical Industries, Ltd., has expended £190 million since the war and the last annual report mentioned that there were still commitments which would cost a further £18·4 million. Three other large chemical groups are likely to spend about £15 million between them in the next year or so.

Apart from the three industries covered by Convention papers, the motor-car and other industries are undertaking vast improvements, and then there are the Atomic Energy Authority which has a £300 million ten-year programme and British Railways with their £1,200 million modernization plan.

What proportion of all this money will be directed towards the electrical manufacturing industry cannot be accurately assessed but it must be very considerable and that is quite separate from the orders for power station equipment which the greatly-increased industrial load will demand. Mr. J. Eccles will give in his Convention paper a ten-year forecast of the demand and will show how the electricity supply industry will satisfy it. He will discuss not only the amount of plant but also its probable nature, with special reference to the part which nuclear energy is likely to take. It seems that by 1965 there will be 36,000 MW of plant installed, about 70 per cent more than the present figure, of which probably about 5 per cent will be nuclear power plant.

With all this in view the prospect is one of continued rapid expansion of the whole electrical industry, not overlooking the domestic branch, if there is freedom from internal dissension and external complications.

THE AUTOMATIC FACTORY

The Institution of Production Engineers is to be congratulated on its conference at Margate last week on the subject of "Automation and its place in our Industrial Future." The wide interest shown is evidence that there was a need for the deep technical and social issues to be ventilated, analysed and, at any rate partly, understood. It was the opinion of speakers that the spread of the developments being described would not lead to redundancy among factory workers and staffs. On the other hand those papers dealing more closely with the application of computers to the work done by machine tools and by clerical departments emphasized that the economies of increased automation lay in the saving in man-power—in the reduction of labour costs. The present scarcity of labour, the trend towards an older population, increased leisure time and the design and manufacture of the new control apparatus will partly take up this gradual decline in machine man-power but emphasis must also be placed on the vastly increased production which accompanies the "automatizing" process. This will result in less displacement of man-power than would otherwise occur but in its turn will throw a heavy burden on the commercial staffs who must ensure that the greater output and improved machine availability are not wasted.

EDUCATION AND AUTOMATION

The re-deployment of labour in its broadest sense is involved in our steady adoption of more advanced techniques. New generations will contain an increasing proportion of technically trained people and fewer manual workers. This throws a burden and a heavy responsibility on our educational establishments. Mr. C. L. Old, principal of the Wolverhampton and Staffordshire Technical College, commanded attention at Margate by his conclusions in a most useful paper that the output of the highest quality graduates from our universities could not be increased much more, that the expansion of higher technical training would have to be in large and well-equipped technical colleges, and that the highest-level course would be of the "sandwich" type. He thought a broadening of outlook and the provision of residential facilities should develop in these colleges and that the Higher National Certificate might well change in character, especially if the professional institutions modified their general recognition of the certificate for membership. These are not new topics but they are vital ones. Automation urges them on to our stage as it will on to many others.

"MONOPOLIES" INQUIRIES

Further branches of the electrical industry are to be subjected to the scrutiny of the Monopolies Commission. Already the lamp and cable industries have been reported upon by the Commission and there has been a protracted investigation of some of the heavy plant branches, a report on which is expected some time next year. Last week the President of the Board of Trade told the House of Commons that he expected to refer to the Commission several other industries including electric street lighting and electric batteries. He also said that he proposed to send to the Commission a general reference covering common prices and level tendering. Without going into the question of the necessity for these inquiries we may say again that they cause a great deal of disorganization and divert efforts which would be better applied to the business being investigated. But, to quote from *Macbeth*:—"When 'tis done, then 'twere well done quickly."

AN INJURIOUS ORDER

It is becoming very evident that the restrictions imposed upon hire-purchase business last February are gravely affecting business in the larger domestic appliances. Manufacturers of gas cookers have already complained of the falling-off in demand attributable to this cause and electric cooker makers are now also feeling the effects. Cookers were not included in the original hire-purchase restrictions but they were brought in by the new Order (S.I. 1955 No. 297). On the face of it a four-year period, with an initial payment of 15 per cent of the cash price, does not seem extremely onerous but for many of the less well-off the conditions seem to have been prohibitive. There was no obvious reason for bringing cooker agreements under control; cookers are not luxuries but necessities. The same may be said of water heating appliances and washing machines and wash-boilers, which are subject to the same terms, and vacuum cleaners, refrigerators and some other electrical appliances, payment for which is limited to two years. We suggest that the Order should be amended or replaced by one less likely to deprive the public of essential electrical equipment and injure those who produce it.

Sir Harry Railing, D.Eng., Hon.M.I.E.E.

THE President of the British Electrical Power Convention for 1954–55 is one of our leading engineer-industrialists and has been largely responsible for building up the great G.E.C. organization. Sir Harry joined the General Electric Co., Ltd., in 1905 after practical training on the Continent and in the United States, to take charge of the Witton test department and laboratories. Two years later he was appointed chief technical assistant in London and in 1911 he became a director of the company and was placed in charge of the Witton Works, inaugurating a period of remarkable expansion. He returned to London in 1933, while continuing to control the Witton organization, and was appointed joint general manager in 1941. In 1942 Sir Harry became vice-chairman and a year later chairman and joint managing director.

His election as an honorary member of the Institution of Electrical Engineers was a recognition of his long and active service to the Institution of which he was President in 1944–45. Sir Harry Railing's knowledge and experience have frequently been put at the disposal of the Government and many industrial organizations. He is a vice-president of the B.E.A.M.A., of which he was chairman in 1944–45, and he is a Past Master of the Pattenmakers' Company. He was knighted in 1944.

Harry Railing

I. *The Dome*

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POWER CONVENTION at BRIGHTON

1. The Dome. 2. Corn Exchange. 3. Sports Stadium. 4. Grand Hotel. 5. Metropole Hotel. 6. Savoy Restaurant. 7. Aquarium Restaurant

27th June to 1st July. Programme of Business and Social Events

NEXT week's British Electrical Power Convention at Brighton will be the seventh of the series which supplanted the former conventions of the Incorporated Municipal Electrical Association when the electricity supply industry was nationalized. It is necessary to emphasize, in case the title misleads, that the Convention is an all-industry event, not merely a gathering of representatives of the electricity supply section. The delegates will also come from the manufacturing, contracting and trading branches as well as from the Institution of Electrical Engineers and the associations representing research, consultants and women.

This year's President is Sir Harry Railing, D.Eng., Hon.M.I.E.E., chairman and joint managing director of the General Electric Co., Ltd., and the Vice-President is Sir John Dalton, A.M.I.E.E., F.C.I.S., chairman of W. T. Henley's Telegraph Works Co., Ltd.

"Electricity and the Future" is the theme of the Brighton Convention. It will be introduced by Mr. J. Eccles, deputy chairman (operations), Central Electricity Authority, who will survey the prospects for electricity supply during the next ten years. Seven other papers are to be presented, three on "The Electrical Industry as a Career" and four on "Electricity and the Industrial Future" in which developments in the steel, coal, chemical and catering industries will be reviewed.

At the annual dinner next Thursday the principal guest will be the Minister of Fuel and Power, Mr. Geoffrey Lloyd. He is to propose the toast of "The Electrical Industry" and the response will be made by the President.

The Electrical Association for Women is to hold its customary luncheon on Tuesday, under the presidency of the Dowager Lady Swaythling. The toast of the Association will be proposed by Sir Harry Railing and Miss L. E. Charlesworth is to reply.

As usual the Convention Exhibition, organized by the British Electrical Development Association, will be an attractive and comprehensive display. A preview is given in later pages of this issue.

The following is a list of the organizations represented on the Convention Council and their representatives:—

Association of Consulting Engineers (Inc.).—Bryan Donkin, B.A., M.I.E.E.

British Electrical and Allied Industries Research Association.—C. T. Melling, C.B.E., M.Sc.(Tech.), M.I.E.E., M.I.Mech.E.

British Electrical and Allied Manufacturers' Association.—B. H. Leeson, C.B.E., T.D., M.I.E.E.

British Electrical Development Association.—S. F. Steward, C.B.E., M.I.Prod.E.

British Refrigeration Association.—T. Whittaker.

British Valve Manufacturers' Association.—J. M. Storey, M.I.Mar.E.

Cable Makers' Association.—A. H. Carmichael.

Central Electricity Authority and Area Boards.—Lord Citrine, P.C., K.B.E., Companion I.E.E., V. A. Pask, C.B.E., M.I.E.E., M.I.Mech.E, W. N. C. Clinch, M.I.E.E., M.Inst.F., D. Bellamy, O.B.E., D.L., F.A.C.C.A., F.C.W.A., Companion I.E.E., F.R.Econ.S., F.S.S., L. Howles, C.B.E., M.I.E.E., M.Inst.Struct.E., F.R.S.A., W. S. Lewis, C.B.E., J.P., Companion I.E.E., A.C.T. (Birm.), J. S. Pickles, B.Sc., M.I.E.E.

Electric Lamp Manufacturers' Association.—W. J. Jones, M.Sc., M.I.E.E.

Electric Vehicle Association of Great Britain, Ltd.—V. W. Dale, Companion I.E.E.

Electrical Association for Women.—Dame Caroline Haslett, D.B.E., J.P., Companion I.E.E.

Electrical Contractors' Association.—L. C. Penwill, C.B.E., Companion I.E.E.

Electrical Contractors' Association of Scotland.—J. D. D. Shaw, M.B.E.

Electrical Wholesalers' Federation.—A. B. Wildsmith.

Electricity Undertakings in Northern Ireland.—A. W. Ferguson, M.C., C.A.

Institution of Electrical Engineers.—T. G. N. Haldane, M.A., M.I.E.E.

Jersey Electricity Co., Ltd.—W. K. Allen, M.Eng., A.M.I.E.E., A.M.I.Mech.E.

National Register of Electrical Installation Contractors.—P. V. Hunter, C.B.E., Hon.M.I.E.E., F.A.I.E.E.

North of Scotland Hydro-Electric Board.—Sir Hugh Mackenzie, C.B.E.

Staff Associations' Committee.—A. M. F. Palmer, A.M.I.E.E., M.P.

Water-Tube Boilermakers' Association.—K. J. McKillop.

In addition to the above associations, the following are also participating:—Douglas Corporation Electricity Undertaking, Electric Light Fittings Association, the Electricity Consultative Councils, Isle of Man Electricity Board, South of Scotland Electricity Board, and the States of Guernsey Electricity Department.

CONVENTION PROGRAMME

Details of the Convention programme are given below. They are reproduced with other information of assistance to delegates in a folder which we have prepared for distribution at the Convention:—

MONDAY, 27th JUNE

9 p.m. *Sports Stadium,* West Street. Official opening of the Electrical Exhibition by the President, Sir Harry Railing, D.Eng., Hon.M.I.E.E.

TUESDAY, 28th JUNE

10 a.m. *The Dome.* Opening of the Convention. Civic Welcome by His Worship the Mayor of Brighton, Alderman J. A. Trevelyan Leak, J.P. Presidential Address by Sir Harry Railing.

12.15 for 12.30 p.m. *Metropole Hotel.* Electrical Association for Women Luncheon. The Dowager Lady Swaythling will preside.

3 to 5 p.m. *Aquarium Restaurant* (Marine Parade Entrance). Ladies' Tea. To meet Lady Railing.
Golf Competitions in aid of the Electrical Industries Benevolent Fund will take place during Tuesday afternoon.

8 p.m. to 12.30 a.m. *Corn Exchange.* Reception by the Mayor of Brighton.

WEDNESDAY, 29th JUNE

10 a.m. *The Dome.* Paper "The Generation of Electricity (a ten year forecast)" by J. Eccles, C.B.E., B.Sc., M.I.E.E., M.I.C.E., M.I.Mech.E. deputy chairman (operations), Central Electricity Authority.

1 p.m. *Savoy Restaurant,* East Street, Brighton Rotary Club Luncheon.

2.30 p.m. *The Dome.* Papers, "The Electrical Industry as a Career."
(a) "The Electricity Supply Industry," by Sir Henry Self, K.C.B., K.C.M.G., K.B.E., Companion I.E.E., chairman of the Education and Training Committee of the National Joint Advisory Council of the Electricity Supply Industry.
(b) "The Manufacturing Industry," by S. E. Goodall, M.Sc.(Eng.), M.I.E.E., vice-president of the Institution of Electrical Engineers and chief engineer of W. T. Henley's Telegraph Works Co., Ltd.
(c) "The Installation Contracting Industry," by R. A. Marryat, B.Sc., A.M.I.E.E., president of the Electrical Contractors' Association (Incorporated).

THURSDAY, 30th JUNE

10 a.m. *The Dome.* Papers, "Electricity and the Industrial Future."
(a) "The Use of Electricity in the Steel Industry," by W. F. Cartwright, D.L., J.P., M.I.Mech.E., assistant managing director, Steel Company of Wales.
(b) "The Use of Electricity in the Coal Industry," by B. L. Metcalf, M.I.E.E., M.I.Mech.E., chief engineer, National Coal Board.
(c) "The Use of Electricity in the Chemical Industry," by G. Nonhebel, B.A., B.Sc., F.R.I.C., F.Inst.F., fuel technologist and head of the Fuel Economy Section of Imperial Chemical Industries, Ltd.
(d) "The Use of Electricity in the Catering Industry," prepared by the Commercial Electrical Catering Apparatus Section of the British Electrical and Allied Manufacturers' Association and presented by Felix A. Rogers, M.B.E.

7 for 7.30 p.m. *Corn Exchange.* Annual Dinner and Dance.

FRIDAY, 1st JULY

10 a.m. *The Dome.* Electrical Forum.
12 noon. *The Dome.* Annual General Meeting.

Dounreay Nuclear Power Station

THE United Kingdom Atomic Energy Authority (Industrial Group) has placed a major engineering contract with John Thompson, Ltd., in connection with the Dounreay nuclear power station. As announced in the Government White Paper, "A Programme of Nuclear Power" (see *Electrical Review,* 25th February), this station is the first "fast breeder" reactor power station to be built in the United Kingdom as a full scale experimental model capable of producing power.

The work to be carried out by John Thompson, Ltd., involves the development, in collaboration with A.E.A., of methods of fabrication for the liquid metal circuits, the design of complete steam and water equipment, the manufacture of the whole of the fusion-welded stainless steel vessels, liquid metal pipe lines, primary and secondary heat exchangers, boiler drums and of the associated plant, valves and instrumentation, together with the feed water treatment plant. The company has developed a separate department to deal with this contract, and manufacture has commenced.

It was stated in the White Paper that the Dounreay station was to be built to produce data and experience for the further development of fast reactor stations in order to obtain a large positive "gain factor" in the breeding of plutonium. Because of this positive "gain factor," i.e., the production of more fissile material than is consumed, the eventual commercial stations of the "fast breeder" type will provide a better utilization of the nuclear fuel than any of the earlier gas-cooled or liquid-cooled thermal reactors which it is proposed to build.

Many difficult technical problems arise, however, in the development of the fast reactor. The reactor operates without the moderator used in the type being built at Calder Hall, and its small core presents problems associated both with heat transfer and with the effect of high temperature on the fuel elements. These problems were referred to by Sir John Cockcroft, director of the Atomic Energy Research Establishment, when he recently delivered the James Forrest lecture to the Institution of Civil Engineers (*Electrical Review,* 3rd June). It is not anticipated that a commercial station of the fast reactor type could be tested in operation until 1965 at the earliest.

The work now being executed by John Thompson for the Dounreay station is quite separate from that which the company is carrying out in collaboration with the Associated Electrical Industries, Ltd., in the development of gas-cooled thermal reactor plant, such as will be used in the first commercial nuclear power stations.

Industrial Application of Nuclear Power

B K. J. BOBIN*

An Assessment of the Present Position

WHEN the fission process was discovered more than 15 years ago, it was immediately realized that vast resources of energy were available in a new and potent form. Owing, however, to the second world war, emphasis was focused on the strategic advantage to be gained from the destructive power of a bomb using this process of nuclear fission.

Since then serious attention has been given to the harnessing of nuclear energy to peaceful uses. Large quantities of radio-isotopes have been manufactured in the Harwell reactors, and this country is now the largest exporter; production last year was worth about £300,000 and nearly half of this was exported to more than 30 countries. However, radio-isotopes are essentially by-products of a reactor programme, and the main task is to harness nuclear energy to produce useful power.

There are three main reasons for seeking to produce useful power from nuclear energy. Firstly to overcome the twin problems of dwindling coal reserves and rising power costs; secondly, to provide power units for remote areas of the world where natural fuel resources are deficient; and thirdly, to build up a nuclear power industry capable of developing and exploiting this young project, and so to capture the valuable export market.

The first reactor in this country, GLEEP, was built at Harwell and was completed in 1947; this was soon followed by the completion of BEPO, also at Harwell, in 1948, and the two reactors at Windscale Works in Cumberland in 1950. All were of the same basic design—natural-uranium, graphite-moderated, air-cooled, although GLEEP and BEPO were primarily for research whereas the Windscale piles were for the production of plutonium. In all of them the heat generated was regarded as a nuisance, and was extracted by exhausters and vented to the atmosphere through suitable stacks. A successful attempt was made to use some of the waste heat from BEPO by placing a heat exchanger in the outlet duct. This has a nominal output of 2 MW, and heats water to 160 deg F which is used to warm an 80-roomed building adjoining the reactor. Economic electric power could not be generated from BEPO as its maximum heat output is only 6 MW, whereas about 3 MW is required to actuate the exhausters.

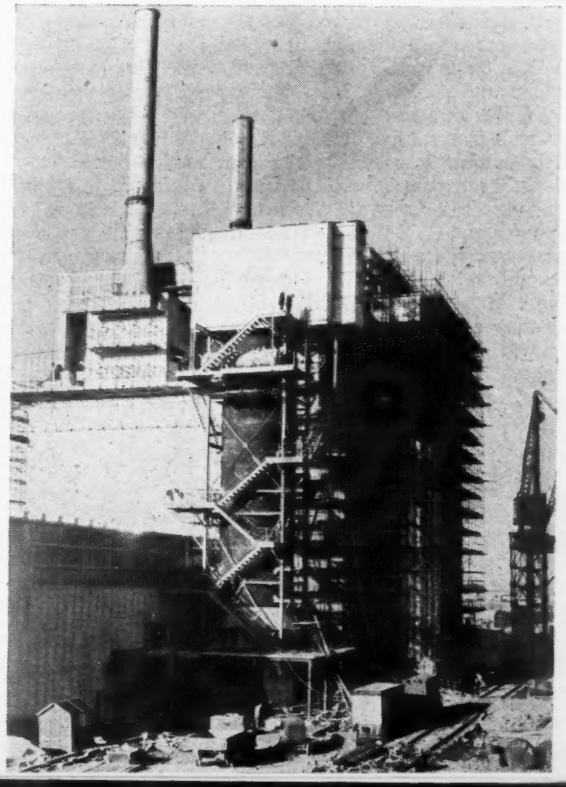
A positive step toward the goal of nuclear power generation was taken about four years ago when a design committee was set up at the Atomic Energy Research Establishment. Its task was to formulate plans for the construction of a gas-cooled reactor to provide electric power. The name given to this reactor was PIPPA. After the initial design study had been completed, the project was taken over by the Industrial Group of the United Kingdom Atomic Energy Authority (as it is now), which has its headquarters at Risley, near Warrington, and the PIPPA Mark I is now under construction at Calder Hall.

As might be expected, the reactors are a logical development of the earlier reactors built in this country. They use natural uranium, are graphite moderated and are gas-cooled. Carbon dioxide is the coolant, and is used under a pressure of several atmospheres. The whole reactor is encased in a suitable steel pressure vessel inside the concrete radiation shield. The four heat exchangers are external to this shield, and have both high pressure and low pressure sections with appropriate economizers, and the steam from these is fed to standard turbo-alternators. The nominal electrical output has been stated to be 50 MW with an overall thermodynamic efficiency of 25 per cent at 700 deg F. The station is expected to be operational in 1956.

Up to the time of the formation of the U.K.A.E.A. last year, all atomic energy research, development and construction work was undertaken by the Ministry of Supply's Department of Atomic Energy, using various industrial concerns as contractors and sub-contractors. It was realized that industry would have to take an ever-increasing share in the work, until it became possible for the Central Electricity Authority or an overseas buyer to place a contract with British firms for the design and construction of a nuclear power station in the same way as they do now for coal- or oil-fired stations. Until the middle of 1954, although industrial groups had been involved in the PIPPA and other reactor design studies, the only firms that had taken any large part in the furtherance of this programme were electrical equipment manufacturers who made control equipment, boiler makers who made the heat exchangers and the pressure vessel for PIPPA Mark I, civil and constructional engineers who had undertaken the various structural work required, and others who had made ancillary equipment. Virtually none of these had detailed

The present state of Calder Hall station

Photo: U.K.A.E.A.



*Reactor School Manager, United Kingdom Atomic Energy Authority.

reactor design experience, and none had complete knowledge of what the whole construction job involved.

The successful design study of PIPPA Mark I, and the cost estimate for its operation, caused a gradual change in the thinking of all concerned with the project. Whereas, hitherto, it had been doubted whether PIPPA would generate electricity economically, it was now realized that economic operation was within our grasp. Although the capital costs would be high, the total generation cost would be much lower than previously estimated, and the total cost would be comparable with coal-generated power.

When the U.K.A.E.A. was formed and assumed responsibility for the whole field of atomic energy one of its first actions was to undertake the preparation of a report on a promised atomic energy power programme. (A summary of this appeared in February, 1955, as a Government White Paper.)† As a result agreements were concluded between the Authority and the following four groups of companies:—Associated Electrical Industries, Ltd., with John Thompson (Wolverhampton), Ltd.; the General Electric Co., Ltd., with Simon Carves, Ltd.; the English Electric Co., Ltd., with Babcock & Wilcox, Ltd.; and C. A. Parsons & Co., Ltd., with Head, Wrightson, Ltd. Each group has set up a design office to work in collaboration with the Authority's Industrial Group, and each will formulate plans for the construction of a PIPPA Mark II, which they will have designed completely. The Atomic Energy Authority will make available to them all relevant data and information, and has already given training to the key members of each design team.

The training of engineers from British industry is of prime importance. Until a company has at least one engineer on its staff with the requisite knowledge, it is difficult if not impossible for it to know how best it may help in nuclear power development and how best it can profit by participation. It was to overcome this basic difficulty that in 1952, the British Electrical and Allied Manufacturers' Association was asked to invite any firm that was interested in the design of power reactors, to second staff to Harwell. During their stay, these people work in projects which are considered to be of interest to their company. This is of mutual benefit to Harwell, and to the attached staff, who thus acquire technological experience. The aircraft and shipbuilding industries have also seconded staff. The number of available places is small, being dictated by the availability of suitable projects and, needless to say, there is keen competition for them. Each year, however, useful numbers of engineers and physicists leave Harwell to return to their own companies, having acquired valuable experience and knowledge, and this helps to disseminate information to all branches of industry.

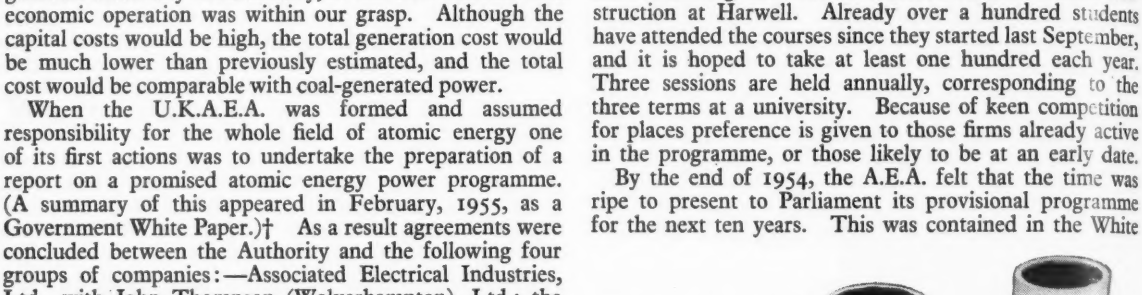
† See *Electrical Review*, 18th February, p. 269.

In order to increase the amount of training available to industry, the A.E.A. last year opened the Harwell Reactor School. Students attend a twelve-week course consisting of over a hundred lectures given by experts drawn from Harwell staff on both classified and unclassified aspects of reactor technology and have the opportunity of visiting and discussing the various reactors built or under construction at Harwell. Already over a hundred students have attended the courses since they started last September, and it is hoped to take at least one hundred each year. Three sessions are held annually, corresponding to the three terms at a university. Because of keen competition for places preference is given to those firms already active in the programme, or those likely to be at an early date.

By the end of 1954, the A.E.A. felt that the time was ripe to present to Parliament its provisional programme for the next ten years. This was contained in the White Paper already referred to. The White Paper sets out the details of what the Authority considers to be the steps to be taken. Briefly they are to concentrate initially on the building of the natural-uranium gas-cooled type of reactor similar to PIPPA, now under construction at Calder Hall in Cumberland. This will be virtually PIPPA Mark II, but further improvements, particularly a higher heat rating of the reactor (that is increased heat output per ton of fissile material) and better thermodynamic efficiency will be obtained in PIPPA Mark III. Alternatively, liquid-cooled reactors could be built; these, except for heavy water reactors, require enriched fuel, and cannot be constructed until stocks have been accumulated.

After this initial ten-year development period, it will probably be possible to concentrate on more advanced units such as the homogeneous reactor or the power breeder

Model of Calder Hall station when completed



PROVISIONAL CONSTRUCTION PROGRAMME

Begin construction	Operational	Type	Total output	No. of stations	No. of reactors	*Estimated total cost (millions)
1957	1960	Gas-cooled	400 to 800 MW	2	4	£35
1958–59	1963	Improved gas-cooled		2	4	£45
1960	1964	High-rating gas-cooled	well over 1,000 MW	4	4	£125
1961–62	1965	Liquid-cooled		4	4	

*Excluding the initial charges of uranium, which are estimated to cost a total of £40 million for the sixteen reactors.

type. A power breeder is at present under construction at Dounreay in Caithness, in order to gain operational experience of this type of unit. Both the fast breeder and the homogeneous system depend upon the supply of almost pure fissile material. It is, therefore, necessary to concentrate initially on the thermal reactors, in which plutonium is produced in the fuel elements and afterwards extracted by chemical processing, and on the operation of a diffusion plant for increasing the proportion of the fissile 235 isotope in uranium. Not until sufficient stocks of such material are available will it be desirable to cease building the natural uranium PIPPA type, but even so, because of the safety of the gas-cooled type of reactor, it may be preferred long after other types are available.

It is to be expected that within the next decade the design and construction of nuclear power stations will become almost as familiar a part of the industrial scene as the construction of coal-fired stations is now.

It is reasonable to assume that three main classes of companies will be involved. Firstly, the major contractors, capable of completely designing and constructing a nuclear station; only the largest companies or groups may be capable of undertaking this task. Secondly, the consulting engineers, in their traditional role of independent advisers and assessors both for home and overseas buyers; and thirdly, large numbers of smaller companies who would concentrate on one or two aspects only, such as the manufacture of control equipment or boiler and heat exchanger plant.

We must look ahead to the time when industry is capable of building up a valuable export trade. The experience they will get during the next decade as a result of our development programme should lay a sure foundation for very rapid expansion in both home and export markets.

The A.E.A. will, of course, give all possible assistance and advice to industry and the Electricity Boards in order that they may proceed with the utmost despatch. The Authority will remain primarily a development and research organization, concentrating on the construction of novel types of reactor, leaving industry to concentrate on the improvement and exploitation of approved types.

The Authority will also be responsible for the procurement, processing and fabrication of uranium and other fissile materials. Initially, the Authority will manufacture the fuel elements for industrial reactors, and will probably "loan" the elements to the Electricity Boards for a fee and recover them when spent, in order to re-process and extract the plutonium. Ultimately it may be possible for industry to build its own fabrication and processing plants, but this would need a change in the existing law. The Authority's facilities may well be sufficient for the next ten years, although extension of the present facilities is implied in the White Paper.

We all realize that, at present, nuclear power generation is in its infancy, the exact costs are unknown and each station built is a new and different project. But, as time passes, we can expect general improvements in design and a gradual lowering of cost. Most important, construction and operation of such stations will have become standard engineering practice, instead of being a new and unexplored field.

With a large body of British industry capable of undertaking this type of construction, we shall also be in a strong position to exploit the many revolutionary changes in technique which are bound to arise and cannot now be foreseen. Then and only then will we be able to fulfil our traditional role of exporters, to the mutual benefit of ourselves, the Commonwealth and the rest of the world.

To our knowledge Russia has one 5 MW plant, and the United States has a five-year programme for the construction of five demonstration reactors for power production. We are thus in a race for the development of commercial nuclear power plants. We have three things to encourage us—the usual competitive desire to be first, the demonstration to the rest of the world of our interest in the peaceful uses of atomic energy, and the capture of foreign markets. In the words of the White Paper, "the stakes are high, but the final reward will be immeasurable."

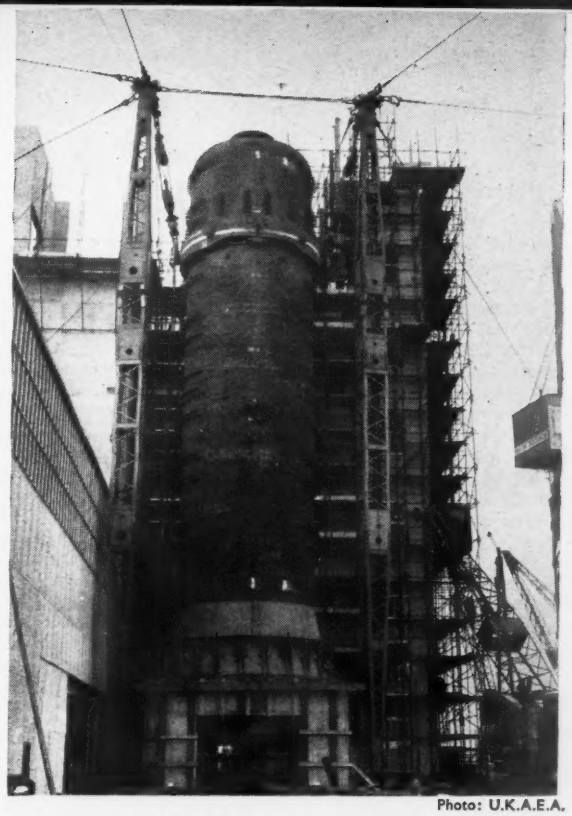


Photo: U.K.A.E.A.

Calder Hall heat exchanger in position

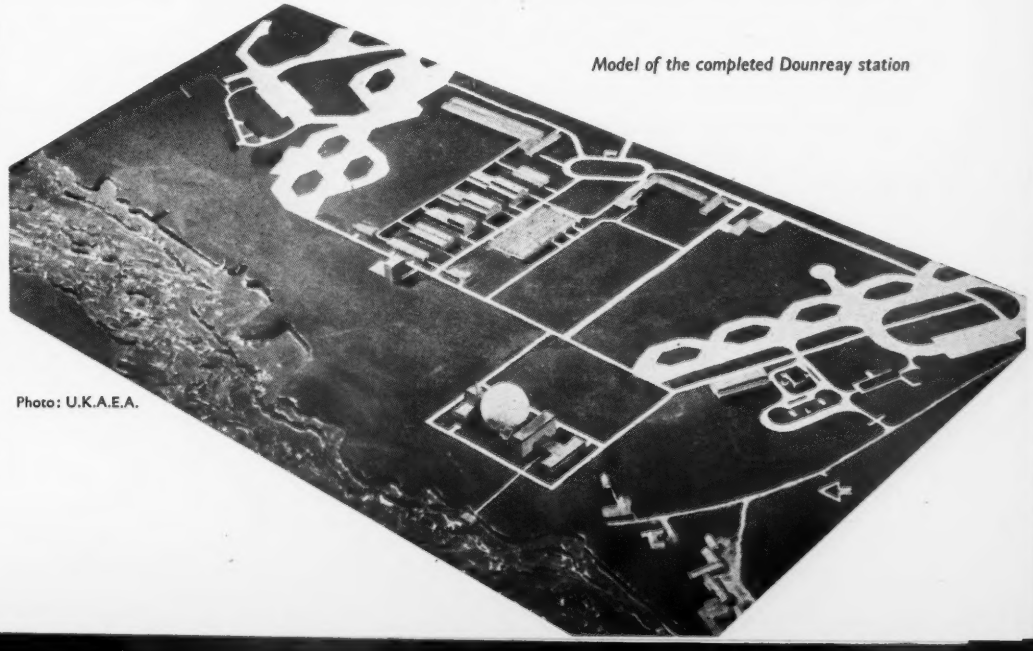


Photo: U.K.A.E.A.

Model of the completed Dounreay station

Convention Exhibition

ALMOST 100 manufacturers and associations are participating in the exhibition being held next week at the Sports Stadium, West Street, Brighton, in conjunction with the British Electrical Power Convention. This exhibition, which originated with a display of electric cooking equipment, has now grown to such dimensions that this year it can claim to be one of the most comprehensive displays of electrical equipment to be staged outside London. Altogether it will occupy approximately 23,000 sq ft of floor space.

Daily during the course of the exhibition members of the staff of the South Eastern Electricity Board will be giving demonstrations of the use of electricity in the home.

Manufacturers are taking the opportunity of displaying their latest appliances and some of the equipment to be shown will, in fact, be seen for the first time. The heavy apparatus is housed in a canvas building in the adjoining car park where there is also a special display of commercial catering equipment.

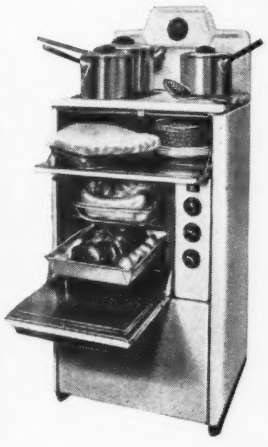
The exhibition will be open from 10 a.m. to 9 p.m. from Monday to Thursday and from 10 a.m. to 4 p.m. on Friday. The general public will be admitted on Wednesday, Thursday and Friday.

LIST OF EXHIBITORS AT THE BRIGHTON EXHIBITION

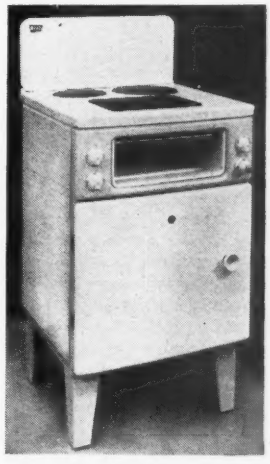
	Stand No.
AIDAS ELECTRIC, LTD., Sadia Works, Rowdell Road, Greenford, Middlesex	19
AUSTIN CROMPTON PARKINSON ELECTRIC VEHICLES, LTD., 95-99, Ladbroke Grove, W.11	100
BACKER ELECTRIC CO., LTD., Fitzwilliam Road, Rotherham, Yorks	21
BELLING & CO., LTD., Bridge Works, Southbury Road, Enfield, Middx	38
BERRY'S ELECTRIC, LTD., Touchbutton House, Newman Street, W.1	36
BEST PRODUCTS, LTD., Felix Works, Felixstowe, Suffolk	34
BRAY, GEO., & CO., LTD., Leicester Place, Blackman Lane, Leeds 2	50
BRITISH INSULATED CALLENDER'S CABLES, LTD., Prescott, Lancs	25
BRITISH NATIONAL ELECTRICS, LTD., Charlton, S.E.7	46
BRITISH REFRIGERATION ASSOCIATION, 1, Lincoln's Inn Fields, W.C.2	97
BRITISH THOMSON-HOUSTON CO., LTD., Crown House, Aldwych, W.C.2	55
BRITISH VACUUM CLEANER & ENGINEERING CO., LTD., Goblin Works, Leatherhead, Surrey	94
BRUSH ELECTRICAL ENGINEERING CO., LTD., Loughborough, Leics	99
BRYCE ELECTRIC CONSTRUCTION CO., LTD., Kelvin Works, Hackbridge, Surrey	90
BULPITT & SONS, LTD., Swansea Works, Birmingham, 1	32
BURCO, LTD., Rose Grove, Burnley	69
CABLE COVERS, LTD., St. Stephen's House, Westminster, S.W.1	82
CABLE MAKERS ASSOCIATION, High Holborn House, 52-4, High Holborn, W.C.1	52
CARRON CO., Carron, Falkirk	54
CENTRAL ELECTRICITY AUTHORITY, British Electricity House, Winsley Street, W.1	24
CHILTON ELECTRIC PRODUCTS, LTD., Hungerford, Berks	60
CLANG, LTD., Crown Yard, Cricklewood, N.W.2	78
COLE, E. K., LTD., Ekco Works, Southend-on-Sea	12
COURTNEY, POPE (ELECTRICAL), LTD., Amhurst Park Works, Tottenham, N.15	91
CROMPTON PARKINSON, LTD., Crompton House, Aldwych, W.C.2	27
"DIAMOND H" SWITCHES, LTD., Gunnersbury Avenue, W.4	35
DIMPLEX, LTD., Totton, Southampton, Hants	68
DOWSING CO. (ELEC. MFRS.), LTD., Kangley Bridge Road, Lower Sydenham, S.E.26	49
DUBILIER CONDENSER CO. (1925), LTD., Ducon Works, Victoria Road, N. Acton, W.3	72
EASICLENE PORCELAIN ENAMEL (1938) LTD., Darlaston, South Staffs	66
EDISON SWAN ELECTRIC CO., LTD., 155, Charing Cross Road, W.C.2	26
EKCO-ENSIGN ELECTRIC, LTD., Preston House, 45, Essex Street, Strand, W.C.2	65
ELECTRIC LAMP MANUFACTURERS ASSOCIATION, 2, Savoy Hill, W.C.2	23
ELECTRICAL ASSOCIATION FOR WOMEN, 45, Eastcastle Street, W.1	28
ELECTRICAL CONTRACTORS ASSOCIATION, Brighton, Hove & District Branch, 16-18, Church Road, Hove, 3, Sussex	63
ELECTRICAL INDUSTRIES BENEVOLENT ASSOCIATION, 32, Old Burlington Street, W.1	86
ELECTRICAL JOURNAL, Bouverie House, 154, Fleet Street, E.C.4	3
ELECTROLUX, LTD., 153/5, Regent Street, W.1	95
ELLISON, GEORGE, LTD., Perry Barr, Birmingham, 22B	92
E.M.I. SALES & SERVICE, LTD., Hayes, Middlesex	11
ENGLISH ELECTRIC CO., LTD., Queens House, Kingsway, W.C.2	48
FALCO ELECTRICAL APPLIANCES, LTD., Corporation Road, Audenshaw, Manchester	56
FALK, STADELMANN & CO., 91, Farringdon Road, E.C.1	2
FERRANTI, LTD., Hollinwood, Lancs	13
GENERAL ELECTRIC CO., LTD., Magnet House, Kingsway, W.C.2	41
GILLOTT ELECTRO APPLIANCES, LTD., Cotswold Works, Chalford, Nr. Stroud, Glos	31
GRIFFITHS BROS. & CO., LONDON, LTD., Macks Road, Bermondsey, S.E.16	70
HAGUE & MCKENZIE, LTD., Pyramid Works, Sloane Street, Birmingham, 1	29
HALL & PICKLES, LTD., Port Street, Manchester, 1	22
HARBOROUGH CONSTRUCTION CO., LTD., Logan Street, Market Harborough, Leics	100
HEATRAE, LTD., Norwich	10
HENLEY'S, W. T., TELEGRAPH WORKS CO., LTD., 51/53, Hatton Garden, E.C.1	37
HOOVER, LTD., Perivale, Greenford, Middlesex	53
HORSTMANN GEAR CO., LTD., Newbridge Works, Bath	17
HOTPOINT ELECTRIC APPLIANCE CO., LTD., Fletton, Peterborough	18
HURSEAL, LTD., 229, Regent Street, W.1	15
JACKSON ELECTRIC STOVE CO., LTD., 143, Sloane Street, S.W.1	61
JOHNSON & PHILLIPS, LTD., Victoria Works, Charlton, S.E.7	47
LANGLEY, LONDON, LTD., Kelvin Way, Crawley, Sussex	16
LINE EQUIPMENT, LTD., 32, Queen Victoria Street, Mansion House, E.C.4	74
MACLAREN, ROBERT, & CO., LTD., Eglinton Works, Kilbirnie, Glasgow, C.5	43
MARCO REFRIGERATORS, LTD., Manor Works, Streatham Vale, S.W.16	87
MARTINDALE ELECTRIC CO., LTD., Westmoreland Road, N.W.9	89
METROPOLITAN-VICKERS ELECTRICAL CO., LTD., Trafford Park, Manchester	45
METWAY ELECTRICAL INDUSTRIES, LTD., Metway Works, Canning Street, Kemp Town, Brighton, 7	73
MIDLAND SILICONES LTD., 19, Upper Brook Street, W.1	44
M.K. ELECTRIC, LTD., Wakefield Street, Edmonton, N.18	67
MONSANTO CHEMICALS, LTD., 8, Waterloo Place, S.W.1	79
MORPHY-RICHARDS, LTD., 6, Conduit Street, W.1	6
NEW DAY ELECTRICAL ACCESSORIES, LTD., 136, Mary Street, Birmingham, 12	30
PARNALL (YATE), LTD., 255, North Circular Road, Neasden, N.W.10	58
PARTRIDGE, WILSON & CO., LTD., Davenset Electrical Works, Evington Valley Road, Leicester	88
PIRELLI-GENERAL CABLE WORKS, LTD., Western Shore, Southampton	80
PREMIER ELECTRIC HEATERS, Keeley Street, Birmingham, 9	64
REVO ELECTRIC CO., LTD., Tipton, Staffs	57
REYROLLE, A., & CO., LTD., Hebburn, Co. Durham	84
RHEOSTATIC CO., LTD., Farnham Road, Slough, Bucks	71
SALFORD ELECTRICAL INSTRUMENTS, LTD., Peel Works, Silk Street, Salford, 3	20
SANGAMO WESTON, LTD., Great Cambridge Road, Enfield, Middlesex	33
SANTON, LTD., Somerton Works, Newport, Mon	59
SIEMENS BROTHERS & CO., LTD., Woolwich, S.E.18	8
SIEMENS ELECTRIC LAMPS & SUPPLIES, LTD., 38-39, Upper Thames Street, E.C.4	9
SIMPLEX ELECTRIC CO., LTD., Broadwell, Oldbury, Birmingham	39
SMITH METERS, LTD., Rowan Road, Streatham Vale, S.W.16	51
SMITHS ENGLISH CLOCKS, LTD., Sectric House, Waterloo Road, N.W.2	98
SOUTH EASTERN ELECTRICITY BOARD, 10, Queens Gardens, Hove, 3	4
SOUTH WALES SWITCHGEAR, LTD., Blackwood, Mon	75
STANDARD TELEPHONES AND CABLES, LTD., Connaught House, Aldwych, W.C.2	40
SUNBEAM ELECTRIC, LTD., 14-16, Old Quebec Street, Marble Arch, W.1	7
SUNVIC CONTROLS, LTD., No. 1 Factory, Eastern Industrial Estate, Harlow, Essex	14
TELEGRAPH CONSTRUCTION & MAINTENANCE CO., LTD., Telcon Works, Greenwich, S.E.10	76
THORN ELECTRICAL INDUSTRIES, LTD., 105-109, Judd Street, W.C.1	96
TRICITY COOKERS, LTD., 109, Kingsway, W.C.2	62
TUFNOL, LTD., Perry Barr, Birmingham, 22B	83
VACTRIC, LTD., 196, Sloane Street, S.W.1	42
WIGGIN, HENRY, & CO., LTD., Sunderland House, Curzon Street, W.1	1
WILKINS & MITCHELL, LTD., Darlaston, South Staffs	93
YORKSHIRE SWITCHGEAR & ENGINEERING CO., LTD., Grand Buildings, Trafalgar Square, W.C.2	81

PREVIEW OF EQUIPMENT ON SHOW AT BRIGHTON

AMONG the electric cookers at the exhibition the Revo Electric Co., Ltd., displays the newly introduced Revo "Regent" (illustrated), an attractive cooker finished in a pleasing tone of grey, with white door and splash back. It is supplied in two models; the "553" with grill boiler and two boiling plates and "552" with grill boiler and one hotplate; both can be supplied with either legs or plinth base as required. The 8in hotplate is controlled by a "Simmerstat" switch while the 6¼in boiling plate and grill boiler are both controlled by a three-heat switch and a "Revostat" switch thermostatically controls the oven. The switches are at waist level thus allowing for a very generous oven, and the cooker is suitable for the smaller type of kitchen. The Revo



Tricity "Coronet" has automatic time-switch control



Revo "Regent" electric cooker Model "553"

"Monarch" cooker is also on show; this is now supplied in three colour schemes, i.e., two-tone ivory, white with black hob, and cream with black hob.

Making its first appearance at the Convention exhibition, the new Tricity "Coronet" cooker (illustrated) is shown with the "Queen" and other models in the Tricity range. The "Coronet" is said to be the first popular-priced family cooker to incorporate automatic time-switch control and it has the exclusive feature of specially "tailored" ovenware, claimed to be an entirely new idea in cooker design.

The "Super Comet" automatic cooker is again shown by the Simplex Electric Co., Ltd., with two models of the popular "Creda Star." With each of the cookers is displayed the relevant cooker control unit and timer unit (illustrated).

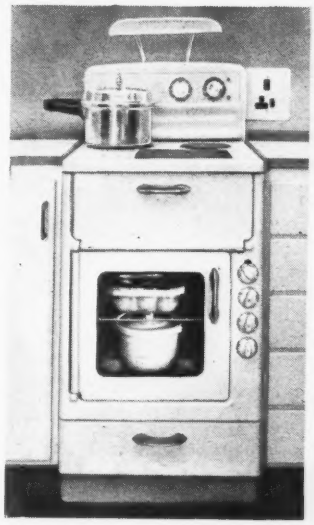
On the stand of the Jackson Electric Stove Co., Ltd., a fully representative range of electric cookers and the "Cookalone" auto-control unit (illustrated) are shown. A special animated display illustrates the working and application of the "Cookalone" unit and visitors are invited to operate the single knob control and then see how it switches the oven on and then off when the pre-set periods have elapsed and the food is cooked. The unit is supplied with tubular supports for both the "190" and "290" series cookers, and as a wall mounting unit for use with all thermostatically controlled cookers. In all cases it is supplied complete with four-core cable for connection to the cooker.

The cookers include models from the "290" series, and, in particular, the new "295" which has two 8in boiling plates, and a large, high and wide oven, which will take a 30 lb turkey, or six large chickens, or equivalent amounts of food. It also incorporates all the features of the "290" series, such as rollers on the back legs for easy movement, towel rails on each side of the cooker, light-weight, lift-off hob, easy-to-read hand-level controls and removable drawer beneath the oven. The Jackson "Clear-View" glass oven door cookers are represented by the "194" which is shown in its new form with the new-style glass oven door with full-size outer heat-retaining door. The switches now have attractive polished metal inserts and bezels. The hot-cupboard, like the oven interior, is now fully finished in "Cleanlite" cream splash vitreous enamel.

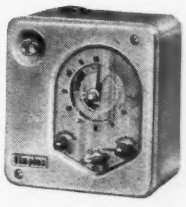
Automatic cooking is also demonstrated on the stand of the General Electric Co., Ltd. "DC114" cookers, in white and two-tone ivory, are shown fitted with the "DC140" auto-timer which has an oven timer which can be set to switch the oven on and off automatically for a meal required up to twelve hours ahead and a clockwork ringing timer which can be set for any time between 2 and 60 minutes. A recessed lamp provides illumination for the hob and the auto-timer is sloped back to protect the easily read dials from damage by utensils on the hob.

Another automatic cooker is the English Electric "2011" (illustrated) with plug-in control panel carrying oven timer switch, ringer-interval timer, neon pilot light and 13 A socket outlet with independent switch. A new type of oven door is now available for this cooker and it may also be fitted to the standard model. The door has a specially toughened and non-splinterable glass panel. Through the glass panel each shelf is clearly visible, and therefore, there is no risk of falling cakes or uneven browning by reason of repeated opening and shutting of the oven door. The cooker itself has a roomy warming and storage drawer and large oven space. "Simmerstats" give infinitely variable temperature control for the grill boiler as well as the two hotplates, and the oven is provided with a thermostat. The standard model "2009D" three-plate cooker is also shown.

An exceptionally wide oven with a new method of oven heat distribution should commend the Carron Co.'s series "L" cookers (illustrated) to the housewife. All corners are rounded, to facilitate cleaning and an extra high splash



English Electric automatic cooker Model "2011"



Simplex cooker timing control

Carron series "L" cooker has smoothly rounded corners

Jackson "Cookalone" auto control unit

plate is fitted. Both the "L.2" (two-plate) and "L.3" models are on view, the latter being fitted with an additional 6¼in diameter solid hotplate.

British National Electrics, Ltd., include among a range of domestic appliances their recent "C.90" model with "Speedheat" oven (illustrated) which reaches 400 deg F in only 12 minutes, and Belling & Co., Ltd., in addition to their standard range of cookers display for the first time some of these fitted with timer controls.

While most grill-boiler units grill reasonably efficiently, their boiling performance is not always satisfactory. With this in mind the new Met-Vick "Redring" two-level boiler-griller (illustrated) has been designed to give high performance for both boiling and grilling and it is claimed that its boiling efficiency is approximately double that of the usual dual-purpose device. Boiling performance is unaffected when grilling is being carried on at the same time and conversely, grilling is unaffected by boiling operations. Another advantage claimed is that it avoids undue concentration of heat in the centre. This is achieved by having the centre element spaced further away from the surface to be grilled or toasted. A miscellaneous range of "Redring" devices includes finned oven heating elements designed to give uniform oven heating and quick heat response while allowing the maximum oven space.

Typical examples of tubular sheathed heating elements shown by the Backer Electric Co., Ltd., cover the boiling plate range with emphasis on the twin circuit "Multicoil" plate (type "8MC"), with its broad element giving greater surface presentation to utensils. Kettle elements and immersion heater ranges are also exhibited and the specialized side of the company's production is illustrated by examples of element formations designed for various manufacturers' appliances. These include percolator, iron, washing machine, water bath and chemical bath heating units.

On their stand Hague & McKenzie Co., Ltd., present the "Pyramid" range of ground base cooking utensils for use on electric cookers, together with a newer range of black ground base utensils for use on cookers fitted with both radiant and solid hotplates. An additional feature at this exhibition is a display of large-capacity utensils suitable for the catering trades.

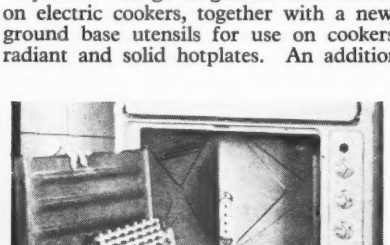
The popular range of Premier appliances includes the "Pylon" kettle (illustrated) in chromium plate, polished copper and aluminium. The complete range of fires is also on show. The "Guardian" is now fitted with a chromium plated reflector and is available in three attractive colours.

A selection from the "Swan Brand" range of electric kettles, domestic appliances and ground base aluminium hollow-ware is included in the display of Bulpitt & Sons, Ltd., and here emphasis is placed on the faster boiling time of the larger sized kettles, 2 kW elements now being fitted as standard in place of 1,800 W, the previous maximum loading. The main developments in the new range of ground base aluminium hollow-ware are the improved lids and non-drip edges.

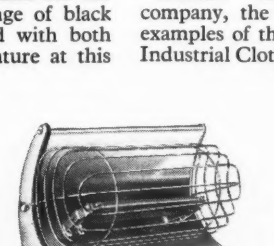
Once again the organ tone of the "Fanfare" kettle can be heard on the Best Products stand and in addition this company's display includes its No. 2 coffee percolator whereby almost instantaneous percolation is obtained by the use of a double jacket fitted at the base of the coffee box stem, which thermally insulates the water surrounding the immersion type heating element.

Metway Electrical Industries, Ltd., exhibit their "Miniway" non-automatic 750 W 2-pint low-cost kettle, complete with connector and flex. In addition, there is an automatic model which has a plug ejector type element, the "Miniway de Luxe." Four-pint and six-pint kettles are also shown. This company has a new range of brooder units. These "Broodaway" units (illustrated), for poultry and pig rearing, are made with two sizes of reflector with either dull or bright emitter and all shades are fitted with earthing screw.

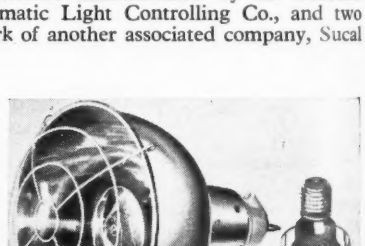
The focal point of Dowsing Co.'s exhibit this year is the new electric blanket which is shown in addition to the company's industrial ironing equipment, sealing wax heaters, glue pots and kettles. They also display a range of "Gunfire" time switches manufactured by an associate company, the Automatic Light Controlling Co., and two examples of the work of another associated company, Sucal Industrial Clothing.



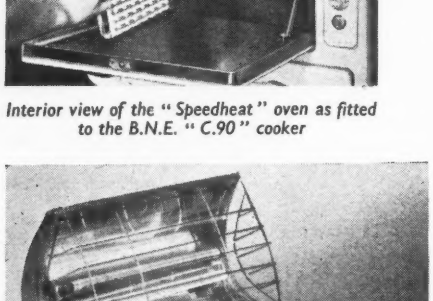
Interior view of the "Speedheat" oven as fitted to the B.N.E. "C.90" cooker

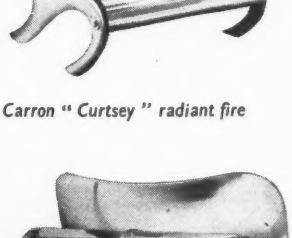


Carron "Curtsey" radiant fire



Metway "Broodaway" chicken brooder unit (dull emitter element shown on right)

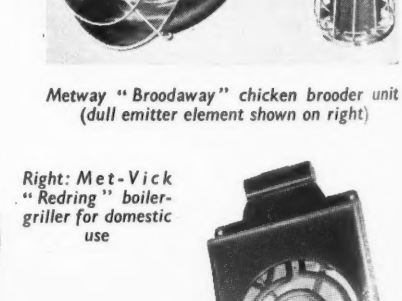




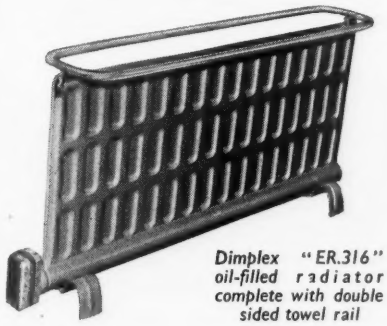
Above: H.M.V. "Ely" fire equipped with multi-parabolic reflector

Left: Two of the Premier range of fires showing the "Paraglow" (top) and "Jewel"

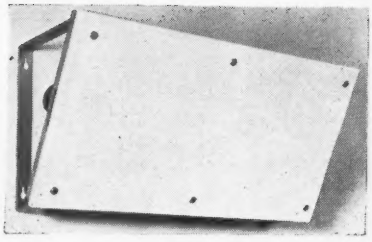
Right: Met-Vick "Redring" boiler-griller for domestic use



Left: Premier "Pylon" kettle



Dimplex "ER.316" oil-filled radiator complete with double sided towel rail



"Thermovent" high temperature panel (type "HTP") for local and short period heating

Right: Ferranti "C.F.5168" background convection heater

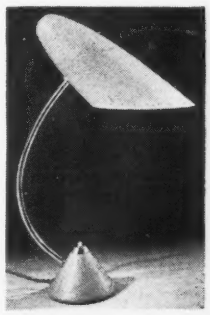
A number of manufacturers are taking the opportunity to introduce new fires for the coming season and prominent among the Ferranti exhibits is a display of radiant electric fires including several new models and a new background heater (illustrated). The new wall fire, suitable for use in bathrooms, nurseries, etc., incorporates an adjusting rod which controls the movement of the reflector, thus enabling the user to direct the radiant heat beam as desired. The operation of the rod is a simple left-to-right screw action and it can be removed when not required. Two models are available: "W.5148," 750/1,000 W, and "W.5150," 1,000/1,250 W. The new "Builders'" fire, model "P.5160," has been specially designed for use in rooms where the furniture may have to be nearer the heat source than is generally desirable, i.e., in bedrooms, small living rooms, etc. Loading is 1 to 2 kW and two d.p. switches are fitted. The normal principles of convection heating are followed in the "C.F.5168." This fire has a loading of 1 kW and is finished in hammered bronze and has an indicating lamp and safety device to prevent overheating. The new 2 kW floor fire, model "F.5164," incorporates the well-known features of radiant heating, a true parabolic reflector, a brilliant surface, and accurately placed element. The finish is in cream enamel.

A selected range of Heatrae products includes the "Saferod" high level safety heater, and a new competitive range of "Slimrod" immersion heaters for both horizontal and vertical fixing.

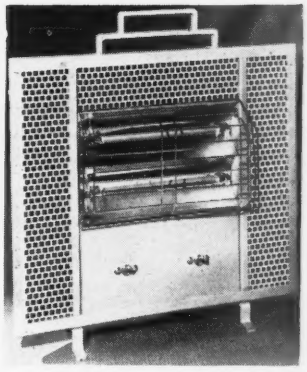
Two illuminated fires of a particularly pleasing and distinctive design, the "Felicity" (illustrated) and "Serenity," are being shown by Falk, Stadelmann & Co., Ltd. An attractive lighting effect provides a warm and cheerful glow quite independently of the heating elements, and gives sufficient light for comfortable television viewing; each has a 2 kW loading. These are but two of a number of fires which Falks are introducing for the new season. Representative of the company's range of contemporary lighting fittings, is an elegant little table lamp (illustrated) with a polished brass stem and brightly coloured shade and base. It has been designed so that the light is thrown forward and the switched base is small and yet heavy enough to support the lamp. The new "Rolac" ceiling switch is also displayed, together with other accessories.

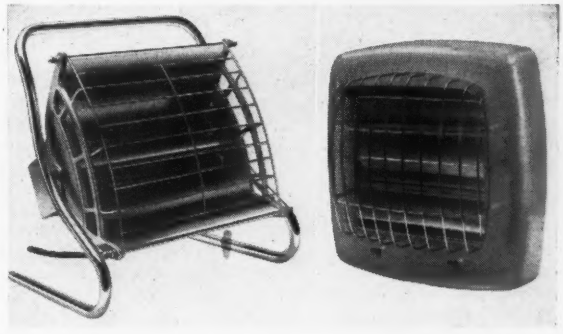
Taking pride of place on the H.M.V. stand are two completely new electric fires, the "Lincoln" and "Ely" (illustrated), of an entirely original design claimed to overcome the disadvantages of conventional reflector fires. The full radiant heat of the fire is spread over an arc of some 150 deg in front of the fire, and because of the duplex curvature, a more even temperature gradient is achieved throughout the room. The "Lincoln" has high-temperature rod type elements of nickel chromium wire, and is rated at 3 kW (with switch for half-heat); an alternative model, rated at 2 kW (or 1 kW on half-heat) is also available. The "Ely," designed for smaller rooms, has a single element of a similar type rated at 1 kW. Other H.M.V. exhibits displayed include the "Cavendish" room heater, and "Milady's" iron.

Berry's stand is divided into six settings; Jacobean, Queen Anne, Adam, Regency, Modern and Contemporary, and framed in each are examples of the fire, wall bracket and ceiling fitting best suited to the period. Also to be seen



One of the Falks' range of contemporary lighting fittings and (right) their "Felicity" illuminated electric fire





Revo "Tubula" (left) and "Outset" 2 kW fires

are "Raydair" background heaters for living rooms, bedrooms, nurseries and greenhouses, and the "New Look" water heaters.

Although not entirely new the Carron "Curtsey" (illustrated) radiant fire, in 1 and 2 kW models, retains its popularity as also do the Revo "Tubula" and "Outset" (illustrated) 2 kW fires.

An extensive range of "Ekco Thermovent" heating equipment designed to meet all general space heating requirements has been extended by the introduction of new flameproof and horticultural thermotubes (types "FP" and "H"), high temperature panel heaters (type "HTP") (illustrated), and a new watertight thermostat (type "WT/45"). Series "B" "Thermovents" are designed for building permanently into walls, partitions and furniture in houses, etc., and are available in 1 kW and 2 kW models. Types "BC" now have a finger-tip thermostat control which replaces the previous internal thermostat. The new control is a horizontal circular knob situated inside the lower grille bars and the temperature can be set over a range of 35-80 deg F.

The G.E.C. "Nightstor" heater, first introduced with a

loading of 1½ kW, is now available in three sizes: 1 kW, 1½ kW and 2¼ kW respectively, and the Belling "Overnite" storage heater, not previously exhibited, is being displayed along with examples of convectors, drying cabinets and "baby" cookers.

Oil filled radiators continue to make a strong appeal both on account of their efficiency and safety. The Dimplex models are available in eight sizes and are finished in eight colours: bronze, gold, silver grey, white, cream, sky blue, pink and eau-de-nil, and are supplied with loadings from ½ kW to 2 kW. All are thermostatically controlled. Single or double sided chromium plated towel rails for easy attachment to "Dimplex" radiators (illus. p. 1113) are shown, and these are available for all models up to 1½ kW. In the North Hall of the exhibition, Dimplex also have a window display.

Two new models have been added to the Hurseal range of oil filled safety radiators, the "Junior" column type (illus. p. 1113) and the "T.V.¾" panel model. For economy of operation both are fitted with built-in thermostats and the loading is ¾ kW.

The new G.E.C. 12in oscillating rubber bladed table fan although similar in appearance to the 10in model is provided with a lever-operated regulator giving two speeds and an "off" position in place of the "on" - "off" switch fitted to the smaller sweep fan. It employs a totally enclosed motor and oscillating mechanism and friction clutch, and has a displacement of 1,400 c.f.m.

A more efficient hot water service for culinary needs is provided for by the "Sadia" type "UDB" 20-gal water heater, a sectional model of which shows the new modified arrangement of the upper and lower heating elements. In lieu of the one 500 W element at the top and the bank of five 500 W elements at the bottom, the latest model has only three elements, each of 1 kW, one placed at the top and two at the bottom of the water heater. The Aidas immersion heaters comprise a selection from the "Dumpy," "U" and "Spirod" ranges.

Non-pressure and pressure type water heaters in the British National Electrics, Ltd., display include the popular "Twin" model, and the 1½ and 3-gal non-pressure type models recently reduced in price.

The new, inexpensive, compact 3-gal Creda "Crusader" water heater and several "Double D" "Redhead" immersion heaters are to be seen on the Simplex stand. These have a thermostat pocket made double diameter width to accommodate either of the conventional rod type thermostats.

To meet the demand for a lower priced fixed temperature setting thermostat Sunvic Controls has recently introduced the type "TQB" water heater thermostat. Other exhibits include stem type "TQA" water heater thermostats; type "TO" oven thermostats; one circuit radiant boiling plates; "Simmerstats" in various forms and other control equipment.

The G.E.C. immersion heaters on display also have new and cheaper thermostats and a new dual-service immersion heater is exhibited. It employs two elements, the shorter heating the water down to its own depth and the longer element heating the entire tank.

A new range of water heaters, Heatrae "Lido," is available in 1½ and 3 gal capacity in an attractive range of colours. These provide maximum efficiency in minimum space.

The main exhibit on the stand of Geo. Bray & Co., Ltd., is a range of domestic immersion heaters, particular attention being drawn to two types, one having two elements, with the low wattage density more suitable for hard water areas, and the second a single element of high wattage density produced at a lower price to meet the requirements of hire-purchase schemes. A selection of metal-clad ceramic embedded heating elements used in all types of medium temperature industrial and domestic heating applications is also shown together with electro-ceramic insulators to close dimensional tolerances in a variety of bodies, used by makers of cooking and heating equipment, radio, telecommunication and electronic components, etc.

The Santon "Econometer" (illustrated) is claimed to be an entirely new conception of control unit aimed at greater economy, particularly in the use of immersion heaters. The handle can be set for any time up to 120 minutes and when this time has elapsed, the unit will automatically switch off the appliance it is controlling. If it is desired that the unit should be permanently switched on, the knob is then fixed at the lock-on position. The new design of the "Monmouth" dual-purpose thermal storage water heater incorporates several outstanding features, and the "Beaver" immersion heaters are an entirely new range constructed to accept either the orthodox rod type thermostat or the Santon "Otter" fixed setting instrument.

The British Refrigeration Association has again arranged a Refrigerator Centre for the display of a complete range of the latest Coldrator, Frigidare, G.E.C., Kelvinator and Prestcold domestic refrigerators.

The English Electric 8·3 cu ft refrigerator is shown in two colour schemes, cream with turquoise interior fittings and white with mazarin blue. In the small refrigerator range, the EA34, 3·4 cu ft table model is exhibited in white and cream enamel finish.

The Electrolux "L.500" domestic refrigerator which has two door shelves providing convenient storage for bottles and narrow packets of foods, accompanies the "L.230" 2¼ cu ft model.

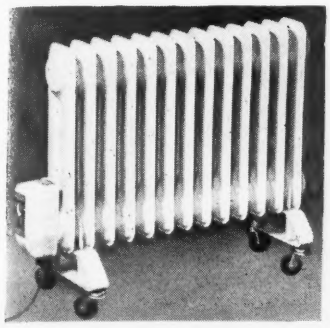
The new G.E.C. 3 cu ft model, the "DE31M" (illustrated), is an improvement on the "DE31" model. It is available in gleaming white or honeysuckle colour external finish and has a "turn-around" top shelf which leaves space for the storage of tall bottles when in one position and provides useful extra shelf area when turned round. Beneath the freezer is a translucent tray in a spring leaf tint and the door of the freezer is made in plastic of the same colour. The "DE52," 5 cu ft refrigerator is similar in external appearance to the company's "DE51" model but has a number of new features including inner door racks.

One of the smallest models on view is an absorption model by Coldrator which has a capacity of only 1½ cu ft. This company also shows its 3·3, 4½ and 7·1 cu ft models (illustrated), the last two incorporating the "Buttador," a compartment in which the user can keep a quantity of butter at the right consistency for spreading. Coldrator also display one of the few home freezers on the market, the "VF54," which has a net capacity of 5·4 cu ft. In the commercial range Marco exhibits include the "Majestic" and "Monarch" frozen food display cabinets, "Victor" 13 cu ft service cabinet, "Minx" 4 cu ft conservator, "Woking" three-quarter vision display and serving counter and a 72 half-pint under-counter bottle cooler (illustrated).

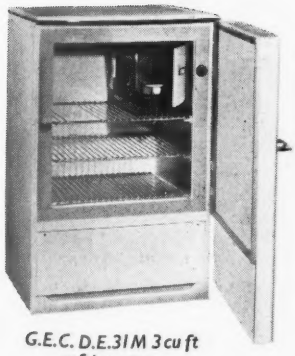
There are also demonstrations of the Ferranti "Fridge-Heater." This compact unit will cool, clean and dry larder air and in addition gives a constant supply of hot water. Running costs are believed to be less than other water-heating methods. The design embodies high evaporation temperatures with ice-making facilities and airing cupboard heat leak, with a very compact construction, and it has all the attributes of automatic hot water heaters and refrigerators and defrosts automatically.

A complete set of G.E.C. cleaning appliances is shown, comprising the new "DM380" upright cleaner, the "DM310A" cylinder cleaner, and the "DM342" polisher. All these appliances are double insulated throughout in accordance with B.S.1645 for maximum safety in service and fitted with T.V. and radio interference prevention devices. Handles of both the upright cleaner and the floor polisher when lowered into the working position start the motor and when raised for storage stop the motor.

The British Vacuum Cleaner & Engineering Co.'s "Goblin" domestic vacuum cleaner range includes the three latest models, the "Ace" ("G.51"), the "Triumph" ("G.52") and the "Clean Sweep" ("G.53"). A novelty in the "Ace" vacuum cleaner is the introduction of plastic tubes, which are light as well as pleasant to handle. In the outside bag type of cleaner, the "Goblin" range continues to be represented by the "Regal" ("G.38"). The company is also displaying its "Teasmade" tea and coffee-makers. The new "Teasmade de Luxe" is a great improvement on its predecessors, the body being constructed entirely of cream washable plastic. In the field of washing machines, the company shows two models which will be available to the public later in the year.

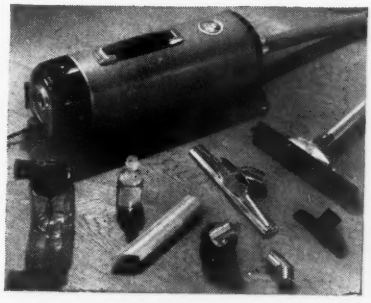


Hurseal ¾ kW oil-filled safety radiator



G.E.C. D.E.31M 3 cu ft refrigerator

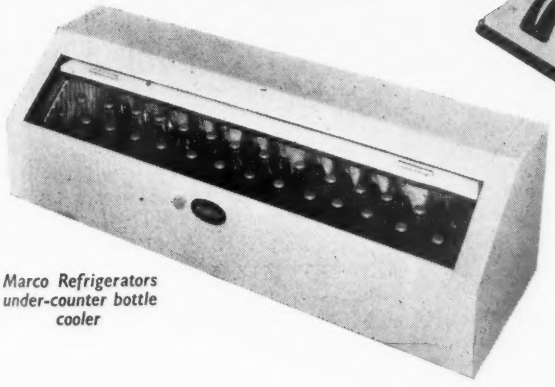
Coldrator "CS.71" 7·1 cu ft de luxe refrigerator



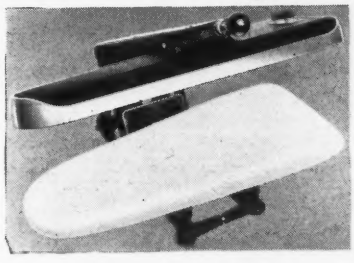
Electrolux "Model 55" suction cleaner including accessories

Left: Vactric "R.53" cleaner

Right: Santon "Econometer" control unit for use with immersion heaters

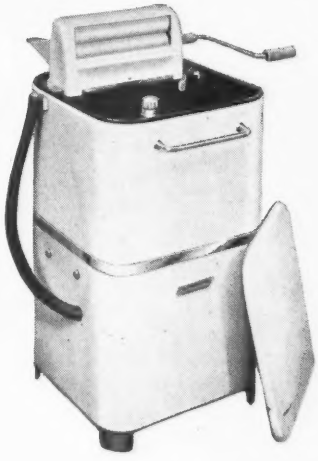


Marco Refrigerators under-counter bottle cooler

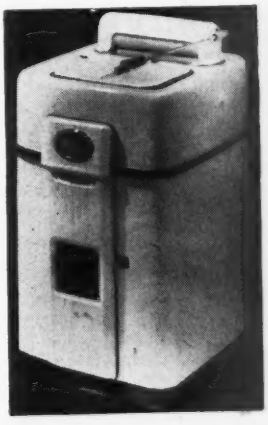


Parnall "Ezy-Press" ironer

Hotpoint "CH/P" heated washing machine



Easiclene "E.W.I." washing machine



"Servis" model S hand wringer type washing machine

In addition to their standard, heavy-duty and "Junior" models Hoover, Ltd., show their cylinder cleaner, "Dustette" hand cleaner and floor polisher and scrubber. Vactric display both upright (illus. p. 1115) and cylinder cleaners and also their floor polisher. For use with the Electrolux "55" suction cleaner (illustrated) the "Turbo Polisher" attachment is quickly attached to the end of the tubes and readily converts it to an efficient floor polisher.

The demand for heated washing machines continues and among the main exhibits of Hotpoint is a heated model of its "CG/P" machine, styled "CH/P" (illus. p. 1115). A rotary ironer, table ironer and a clothes dryer complete their range of home laundry equipment.

Two washing machines of 10 gal capacity with power wringer and automatic draining system form part of the English Electric display. The "4003" washing machine has a 3 kW immersion heater fitted beneath the agitator and separate enamelled table tops are available for both models. The recently introduced tumbler dryer, believed to be the first of its kind to be available on the British market, is also shown and like the washing machines it has a clothes capacity of 9 lb, dry weight.

Although exhibiting their full range of "Servis" washing machines, Wilkins and Mitchell, Ltd., place emphasis on the model "S" hand wringer type (illus. p. 1115).

Easiclene Porcelain-Enamel are showing their "EWI" washing machine (illus. p. 1115) which will fit even the smallest of kitchens, occupying as it does, only 16in square of floor space. Another product of Easiclene is a 2 cu ft table top absorption refrigerator.

Besides the "E.W.50" and the heated "E.W.50/H" washing machines Parnall (Yate) display the Thor "Automagic" spin-dry washer. The "Ezy-Press" plate type ironer (illus. p. 1115) by the same company further facilitates home laundry work.

Almost every wash-day and household hot-water requirement is covered in the comprehensive display of Burco wash boilers and washing machines, ranging from the "375" wash boiler to the "10.P" heated machine. A special feature is the low-priced "122" heated machine (illustrated). Part of the stand is fitted out as a modern kitchen, and actual wash-day demonstrations are carried out.

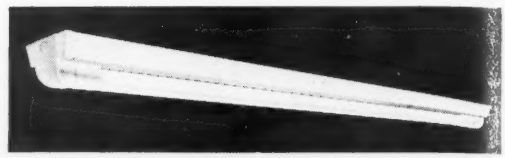
Among smaller domestic appliances to be seen is the English Electric food mixer, with 5 and 2 pint glass bowls (illustrated); it has two clip-in type beaters and a 20-speed control switch. Additional attachments include a mincer with power unit and a juice extractor with oil-dripper for mayonnaise making. An attractive glass plate warmer completes the range.

Built on new principles the H.M.V. food mixer carries out twelve different culinary operations with ease and precision. The basic food mixer set comprises the mixer, mixing dolly, scraper, sausage tube and mincer. Additional accessories are available for shredding, slicing, whisking, potato peeling, liquefying, kneading and juice extraction.

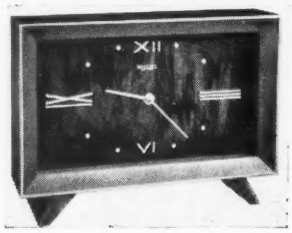
The "Mixmaster" (illustrated) shown by Sunbeam Electric, Ltd., has several exclusive features including the "Mix-Finder" dial which enables the user to set the "Mixmaster" at the correct mixing speed for every job. Optional attachments include a blender, mincer, slicer and shredder and juice extractor, all of which can be attached in a few seconds. The "Sunbeam Shavemaster" to be seen on the same stand has a large and smooth, rounded shaving head. Two models are available, one for the standard voltage and the other with a multi-voltage resistor.

"Buk" and "Kub" electric dry shavers and dry shaver accessories are displayed by Chilton Electric Products, Ltd., together with the "Chilton" domestic hair clipper. Of particular interest is a model of the universal shaver socket incorporating a 5 A three-pin power outlet in addition to the normal shaver socket facilities which is being fitted in the cabins of the new Canadian Pacific liner, *Empress of Britain*.

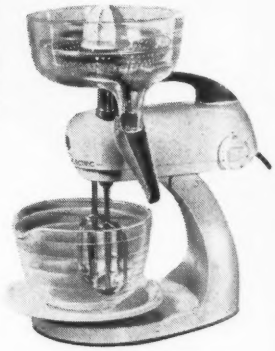
Pioneers of the electric clock in Britain, Smiths of England are showing their full range of "Sectric" models. New designs have been introduced (illustrated) throughout the entire range to correspond with trends in modern taste, in architecture and home decoration. Wall clocks especially will be seen.



Above: Ekco Ensign 5f 80 W slim batten fitting



Smiths "Lynside" mantel clock



English Electric food mixer

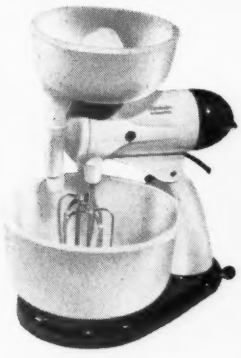
A wide range of electrical components displayed on the stand of Griffiths Bros. & Co. London, Ltd., demonstrate the insulating and impregnating varnishes made by the company. A new product of interest is "Armour 1076/j," specially formulated for the treatment of transformer and switchgear tanks. When used in conjunction with "Ferrodor" metal protection paint it is claimed to offer a complete internal and external treatment.

The E.L.M.A. Lighting Service Bureau exhibit shows recent developments in lamp performance and lighting practice, with a section specially devoted to domestic lighting. The most recent types of luminous and louvred ceilings are being demonstrated, and in the domestic section a feature is made of both indoor and outdoor lighting of plants and flowers.

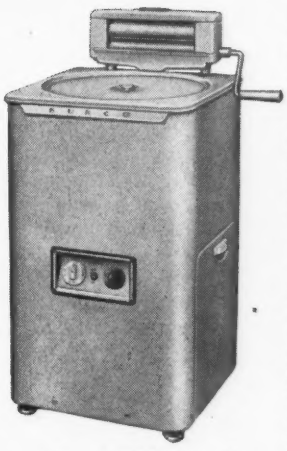
Light, particularly in its relation to colour, is the theme of the "Atlas" stand. The subject is treated with abstract settings in miniature illuminated by electronically-controlled fluorescent lighting, impressively demonstrating the valuable part which carefully planned lighting can play in internal decor. A novel illuminated pictorial exhibit shows the specific uses of each of six "Atlas" fluorescent tube colours in industry, commerce and the home. Space is also devoted to a display of the new "Atlas" school and commercial fittings in "Rotaflex" spun acetate.

Ekco-Ensign Electric, Ltd., exhibits a range of all its lighting products, and a prominent feature is a new low-priced 5ft 80 W single lamp "Slim Batten" fitting (illustrated). A variety of industrial and decorative fluorescent fittings are also on show. The "Ekco White" fluorescent lamp is shown, together with other shades and colours that have been specially developed for industry and commerce. Room is also found for tungsten lamps as well as fluorescent lamp accessories and control gear.

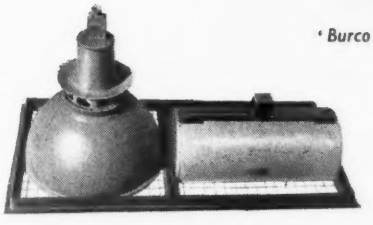
One of the most interesting fittings to be shown by the British Thomson-Houston Co., Ltd., is a protoype of a new cradle introduced to simplify the maintenance of combined mercury and tungsten lighting (illustrated). It has been specially developed for the Velindre Mill of the Steel Company of Wales, where it will be cantilevered out from walkways. A steel tray consisting of a frame of 2in tee section carrying a floor of rigid wire mesh is divided into two parts to support a 1,500 W tungsten filament lamp reflector and a horizontal mercury reflector fitting housing



Sunbeam "Mixmaster" food mixer



"Burco" 122 boiler-washer



B.T.H. "Mazda" blended light cradle fitting for cantilever mounting

the new 1 kW "MA/H" lamp. The fittings rest on the wire guards which also serve to prevent broken glass from falling in case of accident. Both fittings have similar polar distribution and, mounted at heights of 30ft and over, produce no measurable colour shadows.

The fittings are connected to the control gear by flexible cable. "Invertrunking" is used above the stand to support some of the range of "Mazda" decorative commercial fittings and visitors are able to test for themselves the ease with which reflectors may be changed. The recently introduced "Mazda Module" fitting which may be used with either fluorescent or tungsten lamps is also displayed.

The new Ediswan shallow trunking for all types of lighting fittings and light-duty power operated equipment is displayed, and of two runs shown, one carries a standard 5ft fluorescent batten fitting and a "Perspex" enclosed diffuser with louvre; the other supplying four of the latest pendant fittings from the Ediswan "Harcourt" range. Street lighting fittings are represented by the "BT12," "BT20" and "BT22" top entry lanterns all of which are designed for Class B road lighting. Ediswan "Module" recessed ceiling fittings are also shown.

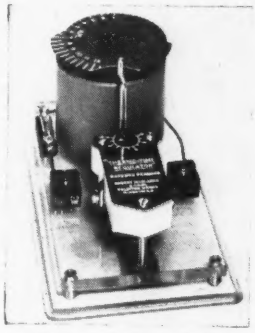
Lack of space prevents Courtney, Pope (Electrical) Ltd., from showing their larger type of fluorescent fittings but in their contemporary range of tungsten lighting fittings emphasis is placed on their application to display and showroom interiors. A new fitting on show is the "Atomette" profile spotlight which uses a dual optical system comprising accurately designed reflectors and a lens system. The model shown utilizes a 48 W 24 V lamp.

Various types of time switches for the automatic control of street lighting will be on view on the Horstmann Gear Co.'s stand, including types "Q" (illustrated) and "Y." The former is of particular interest in view of the development of fluorescent street lighting. It is arranged to control two circuits and, by its use, full lighting may be switched on at dusk, reduced to half lighting at or about midnight, and finally switched off at dawn. In addition to the hand wound types previously offered, this model has now been made available with a synchronous motor driven movement without spring reserve and also with an electrically wound movement with spring reserve. The type "Y" switch is a small compact unit electrically wound and incorporating a 12 hour spring reserve. Other appliances to be seen include the Horstmann flasher unit for zebra crossing beacons and the "Auto Time" control for electric cookers.

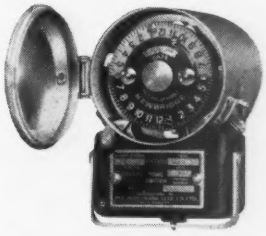
Cooker switches and thermostats fitted with push-on, "fast - on" terminals instead of the more conventional screw and clamp type are exhibited by "Diamond H" Switches, Ltd. Two different series are shown, the first, a modified version of the 3 to 7 a.c. range and the second, a completely new miniature series, suitable for 1,800 W, 240 V hotplates (illustrated). A range of single-, 2- and 3-stage thermostats with shallow facias, plug-in neon pilot lights and front of panel calibration are also shown. Miniature streamlined push-on handle dials with metal inlays are introduced and these supplement the larger types which are shown with trim strips in a wide range of colours.

Included among a full range of "Maclaren" patent thermostats and control instruments is a new thermostat for the control of domestic electric water heaters, type "MB." Designed to satisfy the demand for a smaller and cheaper instrument, it still retains the high quality of established designs and conforms in general dimensions and performance to the B.S.I. Specifications. Special attention has been paid to electrical clearances to suit Canadian and Continental requirements, and both adjustable and fixed setting types are available. Another instrument shown for the first time is the "Maclaren" patent "Thermo-Time Regulator" (illustrated), a combination of thermostat, time clock and programme cam. This should be of particular interest to the supply authorities who offer off-peak tariffs.

In response to the industry's demand for a cheaper thermostat the Rheostatic Co., Ltd., devote part of their display to the new "Satchwell" "VC" thermostat (illustrated). This has a magnetically controlled micro-gap switch and is interchangeable with thermostats to B.S. 1555: 1949. Temperature setting is adjustable. A range of thermostats for cookers is also shown, which includes both stem and liquid expansion capillary tube types. There is in addition a representative selection of temperature controls for a

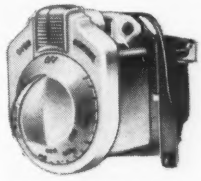


Maclaren "Thermo-Time Regulator"

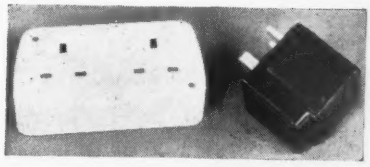


Horstmann Gear Co.'s type "Q" time switch

Satchwell "VC" thermostat



"Diamond H" oven control



Clang surface 13-A twin socket and (right) 13-A multi-plug adaptor

variety of purposes such as space heating, glasshouse control, central heating and air conditioning controls and industrial process controls.

Among a range of over 300 Clang electrical accessories is a new series of weatherproof plugs and sockets in sizes ranging from 5 to 50 A. The 13 A range has been increased and now includes surface (illustrated) and flush sockets, both single and twin, a feature being that all three pins must be fully inserted before the shutter is moved. These are available with either moulded or porcelain interiors. A 13 A multi-plug adaptor is also on view (illustrated).

Tumbler switches, multi-gang units, pilot control units, ring main sockets and the "Fireside" triple socket are included in New Day Electrical Accessories display and portable convector heaters, immersion and fan heaters are shown by their associated company, Gillott Electro Appliances, Ltd.

Single-phase and polyphase Sangamo meters together with rotating sub-standards and other metering accessories including time switches are to be seen on the Sangamo Weston stand. The Weston electrical instruments include switchboard and panel instruments, round, rectangular and edgewise patterns, as well as laboratory standard and sub-standard instruments. Portable instruments and test sets and examples of the newly developed range of hermetically sealed instruments can also be seen.

Technical publications dealing with nickel and nickel alloys in electric and electronic equipment are obtainable from the stand of Henry Wiggin & Co., Ltd. Recent products upon which data is available include "Brightray H," the latest addition to the range of 80/20 nickel-chromium resistance materials and oxy-insulated "Brightray B" a special grade insulated with an oxidized nickel plating which enables it to be used for close-wound tubular resistances.

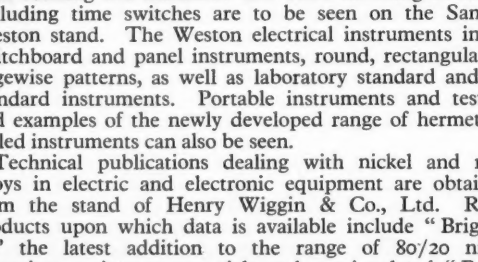
The most interesting exhibit of M.K. Electric, Ltd., is a special display devoted to the new "MK Gridswitch." Using only three boxes a complete range up to eight gangs of varying types and styles can be built up for both flush and surface work and with either metal or insulated frontplates. All components are completely interchangeable. The switches are mounted on removable grids for easy wiring and only four basic switch and grid assemblies are needed to make up the whole range. With these units and the three boxes thirty-eight possible combinations are available.

A model of a hydrogen-cooled generator (illustrated) specially constructed to show the circulation of the hydrogen is on view on the Metropolitan-Vickers stand. Part of the generator casing is cut away and replaced by transparent material revealing the internal ventilation ducts and the direction of flow of the cooling gas. There is also a model of a 120 MVA 275 kV transformer as supplied to the C.E.A. and scale models of the BO+BO and CO—CO locomotives operating on the Manchester-Sheffield electric line.

From the transformer range of the Bryce Electric Construction Co., Ltd., which extends to 15,000 kVA at 132 kV, several units are on view including the core and coils of a 500 kVA, 3,300/415 V oil immersed transformer (illustrated) and a 10 kVA distribution transformer to B.E. Specification T1. The capacitors on show include a tank type having a "Perspex" inspection panel and fitted with a contactor panel for automatic power factor correction; also box type capacitors for the individual power factor correction of induction motors and welding plant.

The new design of straight joint for 33 kV 3-core solid cables, as developed to the C.E.A. and the C.M.A. specification, is given special prominence by British Insulated Callender's Cables, Ltd. The success of British gas-filled cables in overseas markets is shown in a display of 33 kV to 132 kV cables and of particular interest is the separate display of aluminium sheathed 33 kV impregnated pressure cable (illustrated). Also on show are mass-impregnated non-draining cables. Overhead transmission items include steel-cored aluminium conductors for use up to 275 kV and the more recently introduced self-supporting v.r.i. high voltage aerial cables. The application of plastics in cables is displayed by pilot and telephone cables, aerial power cables, temporary earthing leads, and cables for general wiring installations and power circuits.

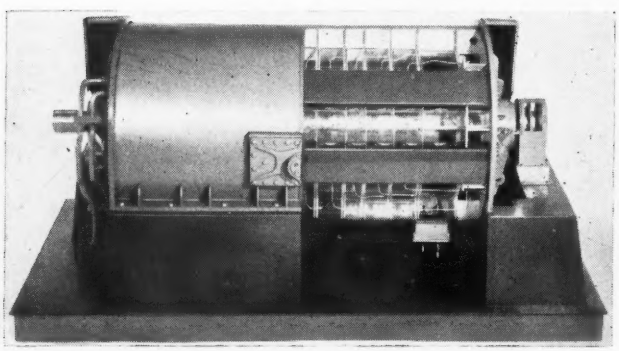
The Telegraph Construction & Maintenance Co., Ltd.,



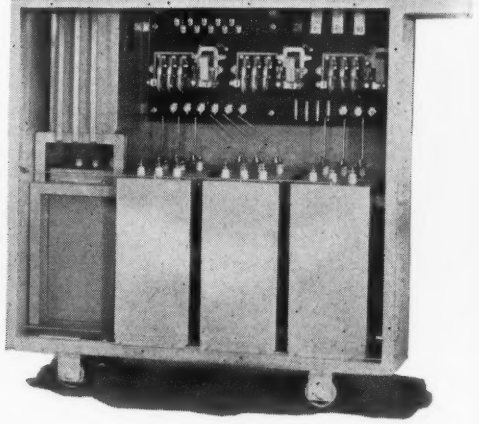
B.I.C.C. three-core 33 kV aluminium sheathed impregnated pressure cable

"Klixon" vehicle circuit-breaker (Salford Electrical Instruments, Ltd.)

Scale model of a Met-Vick hydrogen-cooled generator



Dubilier 105 kVAr, 415 V, 50 c/s, 3-phase automatic control p.f. capacitor



has chosen for its display paper insulated power cables of all types for voltages up to 22 kV with copper or aluminium conductors and lead or aluminium sheaths, polythene insulated power cables for voltages up to 11 kV for underground or submarine use, and polythene insulated 11 kV three-core aerial cable with catenary suspension strand attached, together with appropriate fittings. There is also a comprehensive range of plastic insulated wiring cables, and p.v.c. and polythene insulated armoured cables for 250 and 660 V together with terminating glands and protective shrouds.

The range of high voltage cables displayed by Standard Telephones & Cables, Ltd., include 33 kV and 66 kV solid types and 33 kV, 66 kV and 132 kV oil-filled cables.

Among Henley cables on view are 3-core 110 kV oil-filled cable; single-core and 3-core 132 kV oil-filled cable; and corrosion-resisting p.v.c. sheathed cable, which has been supplied for the Shell Refining Marketing Co. Of particular interest is a telescoped sample of the Newfoundland Land Line cable. An entirely new development is the Henley self-supporting aerial cable, which has passed from the experimental stage and is now being marketed. Various types of aluminium cables are shown, together with p.b.j., h.s.o.s. and many of the newer types of p.v.c. cables. Among Henley Engineering items are the "Series 4" d.p. insulated service fuse, with "Series 4" four-entry sealing chamber; the "Series 3" - 100 d.p. insulated service fuse; and the d.p. insulated connector box.

Capacitor impregnants and transformer cooling fluids form the major part of the Monsanto Chemicals display. "Aroclors" will be featured as fire-resistant capacitor impregnants which permit reductions in capacitor size of as much as 40 per cent, compared with oil impregnated capacitors of equivalent rating. The "Pyroclor" exhibit consists of a working demonstration showing the possibility of operating liquid cooled transformers at higher than normal temperatures. A test transformer will indicate by means of instruments the output from the transformer and the temperature at which it is working. "Lustrex" mouldings are also on show.

The properties of silicones and equipment incorporating these materials is on view on the Midland Silicones stand. Silicones are shown in the forms of resins, elastomers, varnishes, compounds, greases and fluids and also in combination with glass, mica and asbestos.

A comprehensive range of Langley London electrical insulating materials includes mica in all its forms, tooled and fabricated work, laminated plastic sheet and tube. Silicone bonded glass fabric tubing, features of which are its high temperature resistivity and low moisture absorption is produced in quantity.

Partridge Wilson & Co. show products which they manufacture for the distribution of electricity and such duties as switch tripping and closing. Further examples are shown of the "Davenset" products that are used in key situations throughout industry, such as in the charging of lighting installations, electro-plating, starting of aeroplane and road vehicle engines and for the detection of buried metal pipelines and structures by cathodic impression of electric current. "Davenset" transformers are also exhibited.

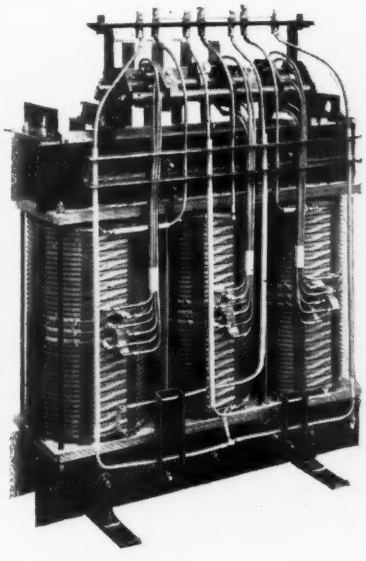
High temperature electrical resistance alloys are exhibited by Hall & Pickles, Ltd., and exhibits include "Nicralloy" and "Kanthal" alloys, tapes and wires, capable of operating at temperatures up to 1,350 deg C. In addition, pyrometer sheaths, "Nikrothal" industrial tubes and radiant plate tubes, and "Kanthal" and "Nicralloy" furnace elements are on show.

Operational requirements to-day demand close control of power system voltage and Brush "on-load" tap changing equipment has been designed and built to provide that facility on three-phase power and regulating transformers. The gear is designed for 33 kV transformers and utilizes the reactor principle for current limitation at the time of switching. Selector and divertor switches are in separate tanks. Two ratings are available, for 250 and 450 A, and many components are common to both switches. With 21 positions for selection of voltage a wide range of supply variations can be obtained. Vertical isolation horizontal draw-out switchgear, type "VBA" (illustrated) has been designed to meet the requirements of the C.E.A. for 6·6 kV and 11 kV systems. The oil circuit-breaker has been fully tested and A.S.T.A. certified for breaking-capacity ratings of 150 MVA at 6·6 kV and 11 kV and 250 MVA at 11 kV.

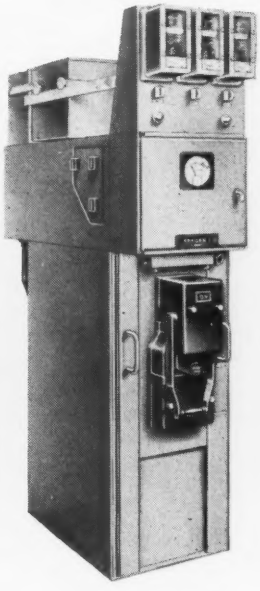
A fully assembled overhead line transmission section complete with conductors, connectors, insulators and stay wires adequately demonstrates the efficiency of the Cable Covers, Ltd., "Cone Grip" principle for connecting overhead transmission lines on this company's stand. Also exhibited is the "CCL-Arro" line tap, an extremely simple connector for which the only tool required is a spanner to effect a connection. The "Talurit" mechanical splice which the company introduced during the past two to three years is also shown.

The Dubilier Condenser Co. display p.f. correction capacitors, includes automatic control equipment (illustrated); a p.f. correction demonstration set, operating to show the reduction in current and kVA; "Duconol" capacitors for

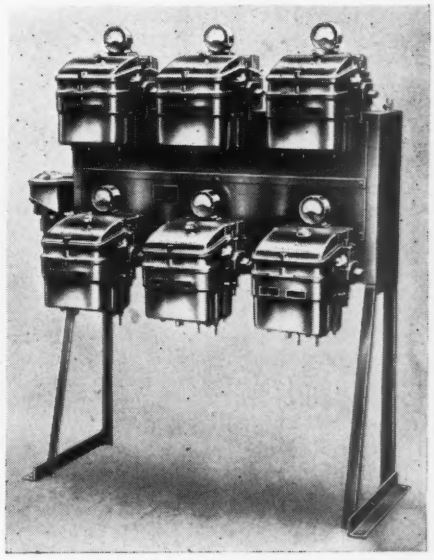
H.v. side of a Bryce 500 kVA transformer removed from its tank



Brush type "VBA" air insulated switchgear



Group of Ellison A.S.T.A. tested direct-to-line starters



fluorescent lighting; " Drilitic " capacitors for a.c. capacitor start motors and other intermittent applications; and oil immersed water-cooled mica capacitors for r.f. heating and associated applications.

The 11 kV circuit-breaker shown by George Ellison, Ltd., has a short circuit rating of 250 MVA and is available for 3-phase systems. It is A.S.T.A tested and complies with B.S. 116:1952. Any number of 11 kV units can be mounted together to form a switchboard and extensions can be readily made. The Ellison 660 V 45 MVA medium voltage switchboard on show is of unit construction and can incorporate almost any combination of circuit-breakers. The breakers which are A.S.T.A. tested and comply with B.S. 116:1952 are housed in steel cases and supplied in current rating sizes of up to 2,400 A and 45 MVA rated breaking capacity. For those interested in group mounting of starters and sequence starting of electric motors, there are the new Ellison 20 A direct-to-line starters (illus. p. 1119) mounted on a busbar chamber.

Line Equipment, Ltd., exhibit expulsion fuse switches of the standard and repeater patterns, fuse isolators, 11 kV standard rocking switches, 33 kV fault throwing switches and load-break switches (fitted with interrupter heads). The company also has on view a number of fuses, of both liquid and expulsion types, and transformer excess load indicators, together with typical clamps and connectors of various designs.

A notable Salford exhibit is the electro-magnetic transducer for remote indication and control systems. This equipment is being used in power stations for such applications as measuring the axial displacement of rotating shafts, or indicating bearing pedestal movement with expansion. The new " Klixon " vehicle circuit-breaker (illus. p. 1118) made by Salford Electrical Instruments, Ltd., is also displayed. Designed for use in low voltage d.c. circuits, it is claimed to have several advantages over the traditional fuse. It obviates " nuisance " trip-outs due to harmless transient overloads and enables equipment to be operated with complete safety at loadings near the maximum permissible. Other exhibits include the G.E.C. " Family " battery charger, made by S.E.I., Ltd., which is shown with a selection of both copper oxide and selenium rectifier stacks, portable and switchboard instruments, link-testing ammeters (up to 5,000 A), link-testing wattmeters and link-testing indicators.

The site model of the experimental nuclear reactor power station at Calder Hall may be seen on the stand of A. Reyrolle & Co., Ltd. In addition, they show some new relays, including a working demonstration of an alarm relay with a number of novel features.

The recently developed Siemens high speed indicator (illustrated) suitable for arrival and departure purposes at railway termini and airports, and for displaying changing market prices, rates of exchange, runners and riders at race meetings, etc., is of interest on the Siemens Brothers group of companies' stand. By utilizing a novel binary control circuit and the latest switching apparatus, the indicators provide a system requiring the minimum of maintenance. Other exhibits include the "Sierack" system of cable carrying, switchgear and fusegear, and a range of telephone apparatus.

The Crompton Parkinson display has as its centrepiece an animated " mural " illustrating the part played by the company's products in the distribution and use of electricity. It includes a main distribution substation, a block of flats, a factory and a farm, and also the associated distribution systems. Many applications are shown of fractional h.p. motors, induction motors, lamps and lighting fittings, as well as the various installations of switchgear, transformers, large rotating machines and cable. The switchgear exhibit shows one of the company's latest vertically-isolated, air-insulated " AI A " range units (illustrated), which complies with the recently introduced C.E.A. specification, YP5. It is of 400 A rating with a breaking capacity of 150 MVA at 6·6 or 11 kV. Fractional h.p. motors include an " A " design motor specially developed for domestic appliances, and a heavy-duty refrigeration motor.

South Wales Switchgear, Ltd., have chosen for their display a " Type C4X " 11 kV 250 MVA 400 A breaker, and a scale model of the "Type U.E.1" 33 kV 1,000 MVA metalclad air insulated unit with vertically isolated oil circuit-breaker. These units may be used as a packet type substation, resulting in a saving of space, and ease of maintenance in all weather conditions, over the conventional outdoor substation. A " T " type switchfuse board (illustrated) for service up to 600 V 800 A is also shown. In this the fusegear is of the flush fronted pattern, incorporating flush instruments, built-in contactors, distribution boards and section switches where required.

A 100 kV oil-immersed rectifier unit with very long life has been developed and produced by Standard Telephones & Cables, Ltd., as a replacement for thermionic diodes which require frequent renewal. Use of the units avoids frequent closing-down of equipment at inconvenient periods as occurs upon the renewal of defective diodes. They withstand a peak inverse voltage of 250 kV and provide a continuous output of 4 mA at 100 kV.

Representative units form the range of " Atlas " miniature h.r.c. circuit-breakers, and " Chilton " voltage operated earth leakage circuit-breakers are effectively demonstrated by Chilton Electric Products, Ltd.

A complete meter test set, together with a meter test rack, is shown by Smith Meters, Ltd. In addition to a complete range of meters, the company is displaying its " Sincos " kVA meter (illustrated) which has been brought into production during the past year.

As a demonstration of insulation for heavy switchgear the interior of an Ellison 11 kV circuit-breaker showing " Tufnol " insulators (illustrated) will no doubt be of interest to electrical engineers. Other components shown include a display of " Tufnol " moulded ball, bell and barrel insulators for telpher lines.

Both outdoor and indoor metalclad switchgear is displayed by Yorkshire Switchgear & Engineering Co., Ltd., together with low voltage equipment comprising fuse switches and motor starters. The outdoor exhibit comprises a two-panel board consisting of a " Type IVIO-13 " circuit-breaker unit fitted with the " Caton " arc trap and a spring assisted fault-making load-breaking oil switch. The circuit-breaker has been certified and the complete unit has been successfully subjected to a three-second test. The indoor equipment includes a single unit automatic oil circuit-breaker (illustrated) which has been certified at 6·6 kV 250 MVA and 11 kV 350 MVA. On the low voltage side exhibits include a board of unit type " Y " fuse switchgear and also a cubicle switchboard fitted with all-isolating type fuse switches and motor starters.

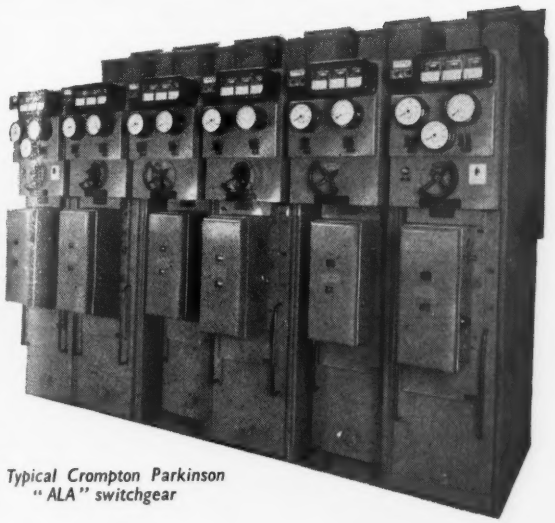
Photoelectric equipment offers an exceptionally simple and economic method of smoke monitoring for places where a chimney stack is out of sight of boiler-house staff and automatic warning is necessary if smoke is to be kept under control. A model of a photoelectric smoke detection and warning system (illustrated) shown on the G.E.C. stand illustrates the system which comprises a light beam projector and photocell, with associated amplifying equipment. The projector is mounted so that it directs a beam of light across the flue which falls directly on the photocell. If the smoke density increases beyond a certain point, it cuts off the beam and causes the photocell, through its associated amplifiers and relays, to switch on a red warning light. This stays on until the smoke density has fallen whereupon a green light alongside is illuminated.

A 20 cwt Morrison-Electricar chassis of completely new design is the principal exhibit of Austin Crompton Parkinson Electric Vehicles, Ltd. It has a turning circle of 31ft (8ft less than on previous models) and there is an improvement in the general accessibility of all parts.

Harborough Construction Co., Ltd., show their " Harbilt " low loader model and also a pedestrian controlled fork lift truck (illustrated).

The Central Electricity Authority's display on this occasion will be in keeping with the theme of the exhibition—" Electricity in the Future "—and the stand will deal specifically with electricity from nuclear fission and working models will be shown illustrating the processes.

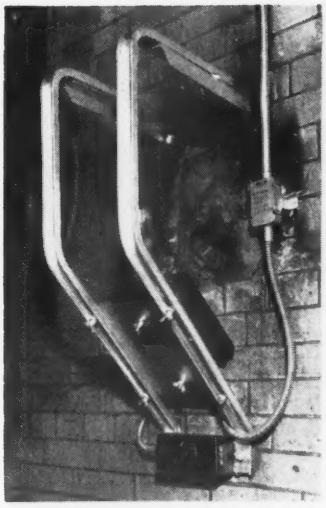
A model arranged to show the advantages of adequate wiring and the ring circuit system is to be seen on the stand of the South Eastern Electricity Board.



Typical Crompton Parkinson "ALA" switchgear

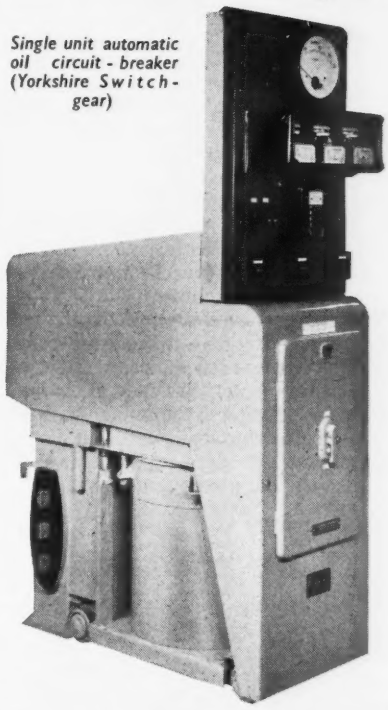
South Wales Switchgear "T" type switchfuse board combined with a type "A8" l.v. oil circuit-breaker

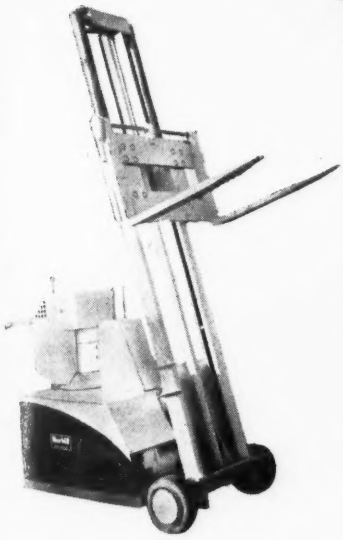
Typical example of a Siemens high speed indicator for airport installation



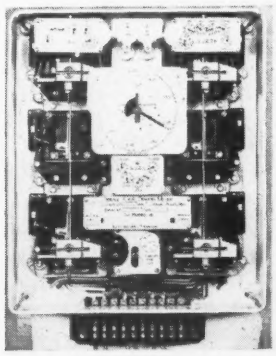
G.E.C. photoelectric smoke detector mounted on the side of a chimney stack

Single unit automatic oil circuit-breaker (Yorkshire Switchgear)

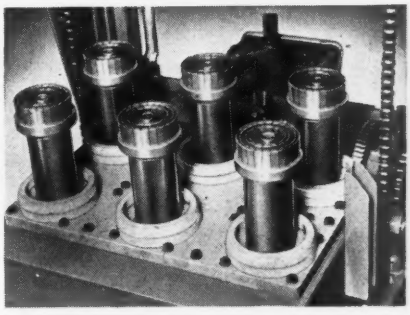




Harborough pedestrian controlled fork lift truck



Smith Meters "Sincos" kVA demand meter



Tufnol insulators assembled in an "Ellison" 11 kV circuit-breaker

GENERATION in GREAT BRITAIN

The Situation at a Glance

THE 1953 British Electrical Power Convention issue of the *Electrical Review* (5th June) contained schedules and a map specially designed to show at a glance the generation position in Great Britain. Their publication was inspired by the approach of the Power Convention; by the almost complete recovery from the wartime and post-war power station plant shortages, as reflected in the far fewer load sheddings of the 1952-53 winter; by the fact that 1953 saw the completion of five years' successful experience in nationalized electricity supply; and by the fact that nearly as long a period had elapsed since the assessment of the generation position in the national supply survey of the *Electrical Review* in 1949 and 1950.

Because of the good reception accorded to these schedules it was decided to re-assess the position again now, two years later, in similar fashion. With the co-operation of the Central Electricity Authority and the North of Scotland Hydro-Electric Board we have endeavoured to show first, by the accompanying map, the position at a glance and, secondly, by means of the quick-reference schedules, also in this article, the position with regard mainly to the plant and its operation. The map and the schedules are linked by suitable reference numbers relating to the power stations. The information given is for the year ended 31st December last and all references to the Central Electricity Authority include also the S.E. and S.W. Scotland Divisions now transferred to the South of Scotland Electricity Board.

Again we very carefully selected the type of information set out in both the map and the schedules after very thorough consideration and consultation with many leading supply engineers, and the only alteration which has been made is the omission of the column in the schedules marked "Capacity of Associated Grid Transformer MVA." The criticism was that there is often not a very true relationship between the power station and the grid transformer.

Load Densities

We have again included a general background to the map in terms of broadly expressed load densities mainly for the Sub-Areas in terms of kW groupings per square mile which remain very much the same as they were two years ago. It must be made clear, however, that this load density scheme is one of general characterization in electrical terms and not one of electrical definition; we emphasize this lest any reader should be tempted to tie up in his mind any of the Sub-Areas, of which the load densities are indicated, with any individual power station or group of stations.

The schedules show that there are 321 stations in operation, including 274 owned by the Central Electricity Authority and 47 owned by the North of Scotland Hydro-Electric Board. This total figure compares with 331 stations in the 1953 schedules of which 284 were owned by the C.E.A. and 47 by the North of Scotland Board. The stations ranged from the very largest stations of up to nearly 800,000 kW, down to others well below 100 kW. The three largest stations with their installed generator capacity are: Barking 747,250 kW, Hams Hall 570,450 kW and Battersea 511,700 kW. The three smallest stations are Chagford 26 kW, Okehampton 75 kW and Market Drayton 88 kW.

The total installed capacity of the generating plant of the C.E.A. stations is 19·19 million kW, compared with 16·5 million kW shown in the 1953 schedules, while the total output capacity of all the stations is 18·2 million kW compared with 15·5 million kW in 1953. The output of all C.E.A. stations during 1954 was 67,000 million kWh compared with 57,000 million kWh for the year represented in the 1953 schedules. The average load on the maximum output capacity of the C.E.A. stations was 44·27 per cent, a slight drop on the figure of 44·58 per cent shown two years ago. Just under 390 million kWh was imported by the C.E.A. from the North of Scotland Board, the corresponding figure for two years ago being 304 million kWh. The electricity purchased from other sources during 1954 by the C.E.A. was 144 million kWh, a considerable drop from the 243 million kWh shown in 1953. Most of this last figure was taken from stations running in parallel with the C.E.A. of which Port Sunlight is an outstanding example, but because of our failure to obtain reliable estimates of the extent of this parallel running in 1953 we have this time made no effort to assess this factor.

Thermal Efficiencies

The total fuel consumed in the generation of electricity by the C.E.A. stations last year was 39·68 million tons and of this amount 45·70 per cent was consumed as pulverized fuel. The overall thermal efficiency for the year was 23·72 per cent as compared with 22·62 per cent for 1952.

We have already said that the three stations with the greatest installed capacities are Barking, Hams Hall and Battersea, and as might be expected these three stations are those with the highest outputs, but the respective outputs are not quite in the same order. The figures are as follows: Hams Hall 1,996 million kWh, Barking 1,993 million kWh and Battersea 1,916 million kWh.

The ten stations with the highest thermal efficiencies during the year were as follows: Portobello (high pressure) 31·27 per cent; Stourport "B" 30·78 per cent; Littlebrook "B" 30·39 per cent; Dunston "B" 29·89 per cent; Bromborough 29·23 per cent; Skelton Grange 28·99 per cent; North Tees "C" 28·98 per cent; Brunswick Wharf 28·71 per cent; Uskmouth 28·57 per cent; and Poole 28·50 per cent.

The stations with the highest steam conditions are as follows: Brimsdown "A" 1,900 lb/sq in, 930 deg F; Brimsdown "B" (high pressure) 1,900 lb/sq in, 930 deg F; Drakelow "A" 1,500 lb/sq in, 1,050 deg F; Stourport "B" (high pressure) 1,500 lb/sq in, 1,050 deg F; Portobello (high pressure) 1,350 lb/sq in, 950 deg F; Taylor's Lane (high pressure) 1,300 lb/sq in, 950 deg F; Stourport "B" (low pressure) 1,250 lb/sq in, 950 deg F; Littlebrook "B" 1,235 lb/sq in, 825 deg F; Carmarthen Bay 940 lb/sq in, 925 deg F.

There are twenty-nine new stations at present under construction or planned in the C.E.A. programme up to 1959 and these stations represent a total of 6·49 million kW.

SCHEDULE OF POWER STATIONS AS AT 31st DECEMBER, 1954

Map Ref.	Name of Station	Type of Prime Mover	Type of Cooling	Method of Fuel Delivery	Total Installed Capacity of Generators MW	Extensions Planned or under Construction—Gen. Sets	Steam Gen. Sets 30 MW and above; Hydro above 10 MW	Total Boiler Capacity—k. lb hr.; million cu ft for hydro storage	Boilers 100 k. lb/hr. and above; gross head in ft for hydro	Steam Conditions at Turbine Stop Valves lb/sq in	Steam Conditions at Turbine Stop Valves deg F	Type of Firing	Year of Commissioning of Oldest Existing Set	Generating Voltage—kV	Electricity Supplied from Station, 1954—Million kWh	Overall Thermal Efficiency, 1954	Time Generating, 1954—Hours	Fuel Consumed (all Types) Thousand Tons
	LONDON DIVISION																	
1	Acton Lane 'A' H.P.	S	T	R	30·0	—	1×30	440·0	4×110	250/600	700/850	CG	1946	6·6, 22·0	112·862	22·91	5,237	71·7
	L.P.	S	T	R	127·9	—		1,400·0	—	250	700	CG	1924	6·6	130·340	14·24	3,842	133·3
	'B'	S	T	R	30·0	4×30	1×30	480·0	2×240	600	850	CG	1954	11·6	39·340	21·46	2,107	27·1
2	Bankside 'A'	S	R	B	79·0	—	—	1,000·0	—	160/250	660/690	OF, CG	1922	11·0	40·958	12·63	1,859	42·9
	'B'	S	R	B	120·0	—	2×60	1,500·0	4×375	900	900	OF	1952	15·0	245·170	25·17	4,586	80·7
3	Barking 'A'	S	R	S	218·7	—	4×40	2,100·0	10×150	350	700	CG, PF	1925	6·6	217·444	14·97	4,606	211·8
	'B'	S	R	S	303·5	—	4×75	4,032·0	8×248 8×256	600	800	CG	1933	12·5	1,158·536	24·32	8,760	690·9
	'C'	S	R	S	225·0	—	3×75	2,025·0	5×405	900	925	PF	1952	12·5	617·416	27·84	7,995	320·6
4	Barnes	S	R	B	6·5	—	—	80·0	—	200	630, 700	CG	1924	6·6	1·303	9·40	393	1·9
5	Battersea 'A'	S	R	S	251·7	—	2×69 1×105	2,400·0	6×250 3×300	600	850	RS	1933	3·3	912·219	24·79	8,760	441·1
	'B'	S	R	S	260·0	—	1×60 2×84 1×100	2,500·0	2×400 4×425	1,350	950	RS, PF	1941	11·0	1,004·450	27·71	8,709	479·7
6	Beckenham	S	R.T.	R.Rd.	4·8	—	—	49·0	—	155	650	CG	1913	3·0	2·731	11·71	1,090	3·5
7	Blackwall Point	S	R	S	90·0	—	3×30	1,095·0	3×365	600	850	PF	1951	11·0	306·108	26·74	6,472	167·0
8	Bow	S	R	R	51·5	—	—	785·0	—	250	650	CG	1921	11·0	22·742	13·59	1,571	23·6
9	Brunswick Wharf	S	R	S	210·0	2×60	4×52·5	3,200·0	10×320	900	900	PF	1952	11·8	1,060·941	28·71	8,760	532·9
10	Deptford East H.P.	S	R	S.B.	105·0	1×52·5	2×52·5	1,450·0	2×225 4×250	900	900	CG, RS	1953	11·8	350·163	27·87	7,377	175·7
	L.P.	S	R	S.B.	127·0	—	—	910·0	—	300	675	CG	1925	11·0	226·002	17·26	8,760	183·0
	West	S	R	S.B.	222·0	—	2×30 3×35 1×50	2,486·0	4×110 1×160 3×176 1×220 2×264	350	750	CG, RS	1929	22·0	628·269	20·14	7,923	433·8
11	Fulham	S	R	S	360·1	—	1×52 5×60	4,600·0	8×260 8×315	600	800	RS	1936	11·0	1,792·929	26·42	8,760	819·7
12	Grove Road	S	T	R	80·2	—	—	895·0	—	210	650, 700	CG	1921	6·6	80·948	14·51	3,401	81·4
13	Hackney 'A' H.P.	S	R	R.B.	70·0	—	2×30	750·0	5×150	370	780	CG, OF	1923	6·6	190·555	21·01	6,024	130·9
	L.P.	S	R	R.B.	21·0	—	—	264·0	—	200	600	CG	1917	6·6	4·587	8·97	649	7·1
	'B'	S	R.T.	R.B.	30·0	2×30	1×30	300·0	1×300	600	850	PF	1954	6·6	0·462	17·21	55	0·4
14	Hammersmith	S	R	B	20·0	—	—	229·0	—	200	650	CG, RS	1922	6·6	4·406	8·22	750	7·1
15	Islington	S	T	R	22·0	—	—	340·0	1×120	180	550	CG, OF	1922	6·6	4·778	5·98	717	9·9
16	Lombard Road	S	R	B	50·0	—	1×30	510·0	2×125	190/300	483·5/750	CG, RS	1919	6·6	30·487	14·39	2,734	29·3
17	Poplar Glaucus St.	S	C	B	15·0	—	—	195·0	—	175/190	498/530	CG	1922	6·6	1·175	6·07	237	2·7
	Watts Grove	S	C.T.	B	25·0	—	—	330·0	—	300	700	CG	1927	6·6	3,655	7·51	438	6·9
18	St. Marylebone	S	C.T.	B	46·6	—	—	550·0	—	190	500, 584	CG	1913	6·6	11·584	8·85	821	18·9
19	St. Pancras	S	C	Rd.	47·6	—	—	340·0	—	200	586	CG, PF	1920	5·2	9·196	10·88	908	11·3
20	Shoreditch	S	C	B	24·5	—	—	282·0	1×100	220	600	CG	1919	6·6	12·736	10·69	2,057	17·1
21	Shorts Gardens	I	—	—	2·8	—	—	—	—	—	—	—	1927	0·21	0·287	25·24	604	0·1
22	Stepney H.P.	S	R	S	50·0	—	1×30	705·0	3×150	350	750, 850	CG, PF	1931	6·6	119·135	19·82	5,045	84·8
	L.P.	S	R	S	31·2	—	—	48·0	—	180	570	CG	1924	6·6	1·945	7·78	529	3·5
23	Taylors Lane H.P.	S	T	R	64·0	—	2×32	750·0	5×150	1,300	950	CG	1943	33·0	218·680	23·68	8,200	135·1
	L.P.	S	T	R	11·5	—	—	130·0	—	190	620	PF	1929	11·0	8·913	12·38	1,507	10·5
24	Walthamstow	S	T	R	19·5	—	—	220·0	—	180	550, 600	CG	1916	6·6	4·476	8·10	740	7·4
25	Wandsworth	S	R	B	22·0	—	—	200·0	5×160	150	600	CG	1914	11·0	4·997	7·77	768	8·8
26	West Ham 'A'	S	T	B.Rd.	64·0	—	1×30	660·0	2×160	190/200	605/750	CG	1923	6·6	30·610	11·49	2,216	38·5
	'B'	S	T	B.Rd.	120·0	—	4×30	1,440·0	8×180	600	850	CG	1949	11·0	447·584	24·97	6,923	263·9
27	Wimbledon	S	R	B.Rd.	25·2	—	—	222·0	—	150/245	500/650	CG	1909	10·0	3·721	7·74	594	6·6
28	Woolwich H.P.	S	R	S.B.	30·0	1×30	1×30	360·0	2×180	600	850	CG	1952	22·0	123·627	23·72	5,557	70·8
	I.P.	S	R	S.B.	104·2	—	3×34·5	990·0	6×165	400	800	CG	1940	22·0	247·040	21·53	7,246	155·4
	L.P.	S	R	S.B.	12·5	—	—	140·0	—	190	600	CG	1928	6·6	1·760	15·31	259	1·6
	SOUTH EASTERN DIVISION																	
29	Ashford 'A'	I	—	—	2·0	—	—	—	—	—	—	—	1926	6·6	264	25·32	173	0·1
	'B'	I	—	—	4·0	3×2	—	—	—	—	—	—	1954	6·76	429	32·67	133	0·1
30	Brighton 'A'	S	S	S.Rd.	190·0	—	1×30 2×37·5 1×50	2,200·0	4×160 4×215 2×350	350/650	750/850	CG, RS, PF	1930	8·0, 11·0	421·916	21·44	5,931	261·1
	'B'	S	S	S.Rd.	166·5	1×52·5 2×60	3×55·5	1,920·0	6×320	900	900	PF	1952	11·0/11·8	700·363	28·37	7,619	332·4
31	Canterbury	S	R	Rd.	4·4	—	—	30·0	—	130/200	500	CG	1922	6·6	1·701	9·72	779	2·2
32	Croydon 'A' H.P.	S	T	R	30·0	—	1×30	325·0	1×150 1×175	490	800	TG	1937	6·6	72·932	18·73	3,539	55·1
	L.P.	S	T	R	56·0	—	—	450·0	2×125	180/265	500/800	CG, TG	1921	6·6	17·326	16·63	965	14·5
33	'B'	S	T	R	210·0	—	4×52·5	2,560·0	8×320	600	850	PF	1950	11·0	836·228	26·27	6,947	441·2
34	Eastbourne	S	T	R	9·0	—	—	110·0	—	250	650	CG	1923	2·2	2·652	9·57	687	3·5
35	Folkestone	S	T	R	7·1	—	—	56·0	—	200	550	CG	1922	6·6	2·035	9·84	966	2·6
36	Gravesend	S	W	B	12·0	—	—	150·0	—	175/215	540	CG	1921	6·6	5·982	14·97	1,030	5·3
37	Guildford	S	R	Rd.	11·2	—	—	150·0	—	250	700	CG	1927	6·6	7·201	13·50	1,207	7·2
38	Hastings	S	T	R	14·2	—	—	187·5	—	250	650	CG	1923	6·6	9·503	14·03	1,468	8·5
39	Horsham	I	—	—	0·7	—	—	—	—	—	—	—	1926	6·6	0·164	26·51	289	0·1
40	Kingston 'A'	S	R	B.Rd.	5·7	—	—	80·0	—	190/225	584/750	CG	1923	3·3	0·449	6·54	242	1·0
	'B'	S	R	B.Rd.	123·0	—	4×30	1,710·0	6×285	600	825	CG	1948	11·5	439·819	24·35	7,029	258·7
41	Lewes	I	—	—	1·2	—	—	—	—	—	—	—	1907	0·46	0·239	24·37	596	0·1

EXPLANATORY NOTES RELATING TO SCHEDULE

In the column giving the types of the prime movers the following code is used: S = steam; H = hydro; I = internal combustion; IH = combined internal combustion and hydro; SI = combined steam and internal combustion; SG = steam and gas turbine.
In the column giving the types of cooling the code is: T = tower; R = river; C = canal; W = well; S = sea; P = spray ponds.
In the column depicting the method of fuel delivery the code is: R = rail; Rd. = road; S = ship; B = barge.
The code for the types of firing is: CG = chain grate; HF = hand firing; OF = oil firing; RS = retort stoker; SS = spreader stokers; PF = pulverized fuel.

Map Ref.	Name of Station	Type of Prime Mover	Type of Cooling	Method of Fuel Delivery	Total Installed Capacity of Generators MW	Extensions Planned or under Construction—Gen. Sets	Steam Gen. Sets 30 MW and above; Hydro above 10 MW	Total Boiler Capacity—k. lb./hr.; million cu ft for hydro storage	Boilers 100 k. lb/hr. and above; gross head in ft for hydro	Steam Conditions at Turbine Stop Valves: lb/sq in	Steam Conditions at Turbine Stop Valves: deg F	Type of Firing	Year of Commissioning of Oldest Existing Set	Generating Voltage—kV	Electricity Supplied from Station, 1954—Million kWh	Overall Thermal Efficiency, 1954	Time Generating, 1954—Hours	Fuel Consumed (all Types) Thousand Tons
	SOUTH EASTERN DIVISION *(continued)*																	
42	Littlebrook 'A'	S	R	S	120·0	—	1×60	1,530·0	6×255	600	800	CG, PF	1939	13·2, 15·0	316·222	23·70	5,507	193·3
	'B'	S	R	S	120·0	—	2×60	1,060·0	4×265	1,235	825	PF	1949	11·8	753·429	30·39	8,674	338·7
	'C'	S	R	S	180·0	1×60	3×60	2,160·0	6×360	900	900	PF	1952	11·0	706·302	28·26	8,668	356·8
43	Maidstone	S	R.T.	B	12·4	—	—	150·0	—	225	630, 700	CG	1908	6·6	7·468	12·36	1,073	8·0
44	Newhaven	I	—	—	0·6	—	—	—	—	—	—	—	1911	6·6	0·190	22·42	722	0·1
45	Ramsgate	S	T	Rd.	3·0	—	—	30·0	—	210	630	CG	1924	6·6	0·878	7·81	886	1·4
46	Thanet	S	T	R	6·0	—	—	70·0	—	150, 200	516/538	CG	1914	2·75	1·645	7·02	776	3·0
47	Tunbridge Wells	S	T	R	11·2	—	—	120·3	—	250	666	CG	1924	6·6	3·277	10·90	894	3·7
48	Woking	S	C.T.	Rd.	7·0	—	—	65·0	—	175	650	CG	1918	2·0	0·613	6·16	247	1·2
49	Worthing	I	—	—	2·3	—	—	—	—	—	—	—	1912	0·5	0·477	21·08	368	0·2
	SOUTHERN DIVISION																	
50	Basingstoke	I	—	—	1·5	1×1·04	—	—	—	—	—	—	1925	11·0	0·632	23·36	692	0·2
51	Cowes	S	R	S	13·0	2×12·5	—	142·5	—	190/400	700/800	CG	1928	11·0	20·178	16·96	3,226	16·1
52	Downton	I(H)	—	—	0·1	—	—	—	—	—	—	—	1930	0·42	0·049	31·98	1,259	—
53	Earley	S	R	R	120·0	—	3×40	1,400·0	7×200	615	815	PF	1942	33·0	354·424	24·40	6,620	195·4
54	Farnborough	I	—	—	0·8	—	—	—	—	—	—	—	1913	3·0	0·018	12·59	42	—
55	Frome	S	T	Rd.	2·3	—	—	37·0	—	160	600	CG	1902	6·6, 11·0	1·153	8·86	785	1·7
56	High Wycombe	S(I)	R.W.	Rd.	4·0	—	—	52·0	—	155	600	CG	1912	6·6	1·554	10·99	784	1·9
57	Hounslow	S(I)	W	B	4·6	—	—	37·5	—	200	550	CG	1915	0·5	1·143	11·88	404	1·2
58	Lymington	I	—	—	0·5	—	—	—	—	—	—	—	1929	0·4	0·221	27·97	504	0·1
59	Newbury	I	—	—	1·6	—	—	—	—	—	—	—	1924	0·5	0·109	24·18	327	—
60	Oxford	S	R	Rd.	22·5	—	—	250·0	—	240	650	CG, RS	1923	11·0	22·228	12·33	2,765	25·7
61	Poole	S	S	S	210·0	1×60	4×52·5	2,720·0	8×340	900	925	PF	1950	11·8	1,291·990	28·50	8,694	595·2
62	Portsmouth H.P.	S	S	S	120·0	—	4×30	1,455·0	2×135 5×165 2×180	600	850	CG	1938	11·0	495·435	24·44	6,867	273·7
	L.P.	S	S	S	20·0	—	—	276·0	—	245	700	CG	1927	6·6	23·310	14·45	5,710	21·8
63	Reading	S	R	Rd.	14·4	—	—	160·0	—	160	550	CG	1923	3·5	7·415	10·22	1,435	9·9
64	Ringwood	I(H)	—	—	0·1	—	—	—	—	—	—	—	1925	0·42	0·327	18·96	115	—
65	Salisbury	S	R	R	2·9	—	—	49·0	—	185	650	CG	1925	11·0	1·574	9·13	694	2·2
66	Southampton H.P.	S	S	Rd.	50·0	—	—	576·0	3×192	400	800	CG	1936	6·6	90·311	20·14	4,704	59·7
	L.P.	S	S	Rd.	38·0	—	—	280·0	—	200	750	CG	1922	6·6	18·992	14·17	2,181	17·5
67	Swindon H.P.	S	T	R.Rd.	20·0	—	—	240·0	2×120	400	800	CG	1943	6·6	32·217	17·45	2,901	26·5
	L.P.	S	T	R.Rd.	15·0	—	—	120·0	—	270	700	CG	1927	6·6	18·966	12·45	3,110	21·4
68	Uxbridge	S	C	B	4·2	—	—	81·0	—	200	600	CG	1916	6·6	0·886	5·36	365	2·4
69	Weymouth	S	S	Rd.	4·6	—	—	76·0	—	200	650	CG	1927	6·6	2·006	7·70	785	3·5
	SOUTH WESTERN DIVISION																	
70	Barnstaple	I		—	2·1	—	—	—	—	—	—	—	1929	6·6	1·168	29·97	786	0·3
71	Bath	S	R	Rd.	20·0	—	—	200·0	—	200	600	CG	1921	6·6	24·852	11·69	3,202	28·8
72	Bideford	I	—	—	1·1	—	—	—	—	—	—	—	1926	3·3	0·048	18·45	72	—
73	Bridport	I	—	—	0·9	—	—	—	—	—	—	—	1929	6·6	0·485	27·28	656	0·1
74	Castle Meads	S	R	R.Rd.	40·1	—	—	500·0	5×100	400	800	CG	1942	11·0	135·488	23·20	7,060	81·3
75	Chagford	H	—	—	0·03	—	—	—	10	—	—	—	1916	0·42	0·116	—	8,134	—
76	East Yelland	S	R	S	90·0	3×30	3×30	1,080·0	6×180	600	850	CG	1953	11·8	313·338	25·25	8,635	146·7
77	Exeter	S	R.C.	R	13·5	—	—	155·5	—	195	566	CG	1922	6·6	10·583	9·70	1,820	13·7
78	Feeder Road	S	C.T.	Rd.	31·8	—	—	350·0	—	200	600	RS, CG	1918	6·6	14·671	8·28	1,394	22·1
79	Hayle H.P.	S	S	S	35·0	1×20	—	400·0	2×100 1×200	400	800	CG	1947	11·0	126·402	20·92	7,878	68·0
	L.P.	S	S	S	32·8	—	—	360·0	2×100	235	700	CG, PF	1928	11·0	110·368	18·19	7,341	68·3
80	Marytavy	H(I)	—	—	3·9	—	—	—	230, 550	—	—	—	1928	0·42	7·893	31·85	7,415	0·1
81	Morwellham	H	—	—	0·7	—	—	—	230	—	—	—	1934	0·42	3·388	—	7,126	—
82	Newton Abbot H.P.	S	R.T.	R.Rd.	30·0	—	—	400·0	4×100	400	800	CG	1943	11·0	84·063	19·68	5,324	60·7
	I.P.	S	R.T.	R.Rd.	15·0	—	—	166·0	—	250	700	CG	1928	11·0	22·004	14·28	2,928	15·8
	L.P.	S	R	R.Rd.	6·8	—	—	100·0	—	150	515	CG	1924	11·0	5·370	9·08	1,394	8·3
83	Okehampton	I	—	—	0·1	—	—	—	—	—	—	—	1927	0·42	—	—	—	—
84	Plymouth 'A' H.P.	S	R	S	40·9	—	—	400·0	4×100	400	800	CG	1941	6·6	92·810	19·51	4,945	63·5
	L.P.	S	R	S	24·8	—	—	160·0	—	190	588	CG	1925	6·6	17·113	11·84	2,174	19·0
	'B'	S	R	S	94·5	—	3×31·5	960·0	3×320	600	850	PF	1951	33·0	429·810	26·06	7,456	226·2
85	Portishead 'A'	S	R	S	248·1	—	2×51·52 2×52	2,720·0	8×162·5 4×250	300	800	CG	1929	6·3, 33·0	959·394	21·03	8,760	562·5
86	South Molton	I	—	—	0·2	—	—	—	—	—	—	—	1929	0·44	0·132	—	561	—
87	Taunton	S	R	Rd.	3·0	—	—	25·0	—	200	600	CG	1930	6·6	1·135	11·22	779	1·1
88	Weston-super-Mare	S	T	R	2·6	—	—	65·0	—	200	500	CG	1923	6·6	1·916	11·60	860	1·9
	EASTERN DIVISION																	
89	Aldeburgh	I	—	—	0·2	—	—	—	—	—	—	—	1908	0·4	0·056	25·57	313	—
90	Bedford	S	R	R.Rd.	20·0	—	—	209·0	—	190	650	CG	1925	6·6	15·025	12·60	1,591	17·5
91	Brimsdown 'A'	S	C.T.	R.B.	53·0	—	1×53	330·0	2×165	1,900	930	CG, PF	1937	33·0	174·297	24·74	6,858	91·2
	'B' H.P.	S	T	R.B.	60·0	1×60	1×60	375·0	2×187·5	1,900	930	CG, PF	1943	33·0	125·466	25·96	4,168	67·1
	L.P.	S	T	R.B.	107·5	—	—	1,250·0	4×200	315	750	OF, PF	1928	33·0	228·035	17·58	5,776	156·8
92	Cambridge	S	R	Rd.	7·3	—	—	87·0	—	200	700	CG	1932	11·0	8·874	13·83	1,999	8·6
93	Clacton	I	—	—	2·7	—	—	—	—	—	—	—	1921	6·6	0·326	20·42	406	0·1
94	Cliff Quay	S	R	S	276·0	—	6×46	3,285·0	9×365	600	825	PF	1949	11·8	1,547·880	26·45	8,760	845·6
95	Colchester	S	P	R	7·5	—	—	82·0	—	240	650	CG	1927	6·6	1·836	6·61	526	3·6
96	Cromer	I	—	—	0·2	—	—	—	—	—	—	—	1911	3·3	0·003	25·29	36	—
97	Finchley	S	P.T.	Rd.	4·7	—	—	50·0	—	170	600	CG	1926	6·6	0·312	2·84	219	1·4
98	Frinton	I	—	—	0·3	—	—	—	—	—	—	—	1912	0·5	0·025	17·68	171	—
99	Great Yarmouth	S	R	S	14·7	2×60	—	230·0	1×108	250	650	CG	1922	6·6	16·140	14·69	1,958	15·4
100	Ipswich	S	R	Rd.	17·2	—	—	222·0	—	250	640	CG	1919	6·6	8·350	11·61	987	10·7
101	King's Lynn	S	R	R	5·2	—	—	75·0	—	200	625	CG	1921	6·6	3·401	11·20	1,158	4·1
102	Letchworth 'A'	S	T	Rd.	12·0	—	—	155·0	—	200	670	CG	1930	3·3	22·320	13·03	3,879	24·9
	'B'	S	T	Rd.	14·5	—	—	160·0	—	200/300	670/850	CG	1942	11·0	52·974	18·32	6,240	42·4
103	Little Barford 'A'	S	R.T.	R	120·0	—	4×30	1,200·0	4×300	650	900	PF	1941	11·0	348·582	25·76	6,516	192·4
104	Luton	S	T	R	24·5	—	—	260·0	—	200/300	650/700	RS, PF	1920	6·6	22·829	13·75	2,292	23·6
105	Norwich H.P.	S	R	S.R.	31·0	—	1×31	480·0	4×120	650	850	CG	1937	6·6	111·788	23·81	5,093	64·7
	L.P.	S	R	S.R.	42·5	—	—	490·0	1×100	250	700	TG, RS, CG	1922	6·6	60·119	15·98	4,040	57·9
106	Peterborough H.P.	S	R	R	40·0	—	—	480·0	3×160	400	800	PF	1951	11·0	96·771	23·14	5,455	63·4
	L.P.	S	R	R	18·5	—	—	210·0	1×100	230	700	PF	1928	6·6	12·624	12·94	1,679	14·8
107	Rye House	S	R.T.	R	128·0	—	4×32	1,400·0	4×350	600	850	PF	1951	33·0	343·531	25·10	6,192	188·6
108	Southend, London Rd	I	—	—	5·7	—	—	—	—	—	—	—	1921	0·5	0·790	18·43	573	0·3
109	Watford	S	R.T.	R.Rd.	37·7	—	—	300·0	1×100	250	750	CG	1920	6·6	45·023	18·02	3,430	37·1

Map Ref.	Name of Station	Type of Prime Mover	Type of Cooling	Method of Fuel Delivery	Total Installed Capacity of Generators MW	Extensions Planned or under Construction—Gen. Sets	Steam Gen. Sets 30 MW and above; Hydro above 10 MW	Total Boiler Capacity—k. lb/hr.; million cu ft for hydro storage	Boilers 100 k. lb/hr. and above; gross head in ft for hydro	Steam Conditions at Turbine Stop Valves: lb/sq in	Steam Conditions at Turbine Stop Valves: deg. F	Type of Firing	Year of Commissioning of Oldest Existing Set	Generating Voltage—kV	Electricity Supplied from Station, 1954—Million kWh	Overall Thermal Efficiency, 1954	Time Generating, 1954—Hours	Fuel Consumed (all Types) Thousand Tons
	EAST MIDLANDS DIVISION																	
110	Burton H.P.	S	R	R.Rd.	30·0	—	—	320·0	—	350	780	CG	1941	11·0	130·268	22·48	6,401	86·1
	L.P.	S	R	R.Rd.	13·5	—	—	216·0	—	200	620	CG	1924	3·3	14·661	10·70	2,183	20·4
111	Chesterfield	S	T	R.Rd	5·5	—	—	62·0	—	155	500	HF, CG	1918	6·6	5·930	8·08	2,067	10·4
112	Coventry 'A'	S	T	Rd.RB	38·5	—	—	400·0	—	300	700	CG	1928	6·6	182·102	17·22	3,032	158·1
	'B'	S	T	Rd.RB	92·2	—	3×30·75	900·0	6×150	300	700	CG	1938	33·0				
113	Derby	S	R	R.Rd.	65·5	—	1×30	695·0	4×110	170/300	520/750	PF	1922	6·6, 33·0	214·233	21·11	6,532	163·5
114	Drakelow 'A'	S	R.T.	R.Rd.	60·0	3×60	1×60	515·0	1×515	1,500	1,050	PF	1954	11·8	0·234	5·04	76	0·5
115	Kettering	S	T	Rd.	7·0	—	—	104·0	—	180	650	CG, SR	1914	6·6	2·986	8·26	778	5·7
116	Leicester H.P.	S	R.T.	R	63·0	—	2×31·5	700·0	4×175	650	800	PF	1949	13·2	369·755	24·86	8,178	243·4
	L.P.	S	R.T.	R	89·2	—	1×30	885·0	3×120 3×175	250/350	700/750	PF	1928	6·6, 33·0	180·523	18·72	4,938	158·6
117	Lincoln	S	R.T.	R	40·0	2×20	—	480·0	4×120	400	800	CG	1947	6·6	87·151	21·29	5,105	58·9
118	Loughborough	S	C	Rd.	4·5	—	—	91·0	—	200	600	RS, CG	1917	6·6	2·645	11·17	1,004	3·7
119	Northampton H.P.	S	R.T	R.Rd.	90·0	1×30	3×30	950·0	4×150 2×175	400	800	CG	1936	33·0	329·766	23·36	6,927	210·7
	L.P.	S	R	R.Rd.	22·5	—	—	210·0	—	200	675	CG, TG	1926	6·6	13·421	10·67	1,699	18·9
120	Nottingham	S	R	R	254·0	1×60	3×30 1×52·5 1×53	2,580·0	4×150 4×175 4×320	250/600	670/850	PF	1925	11·0, 33·0	1,227·143	24·13	8,760	794·5
121	Spondon	S	R.T.	R.Rd.	172·0	—	4×30	1,920·0	6×160	215/350	685/750	CG	1925	6·6, 11·0	696·970	21·19	8,760	494·2
122	Staythorpe 'A'	S	R	R.Rd.	240·0	2×60	4×60	2,880·0	12×240	900	900	SS	1950	15·0	1,279·152	26·94	8,760	705·2
123	Warwick H.P.	S	R	R.Rd.	30·0	—	—	340·0	—	350	750	CG	1942	12·0	73·519	19·67	4,546	55·6
	L.P.	S	R	R.Rd.	12·0	—	—	—	—	250	650	—	1924	6·6	0·828	14·42	314	0·9
	MIDLANDS DIVISION																	
124	Birchills	S	C	Rd.	17·5	—	—	345·0	—	190/290	625/740	PF	1922	6·6	11·502	12·83	2,227	15·0
125	Hams Hall 'A'	S	T	R.Rd.	249·4	—	3×30·4 3×51·5	3,15·00	5×180 9×250	350	730	PF, CG	1929	11·0	409·343	18·15	3,888	367·0
	'B'	S	T	R.Rd.	321·0	—	6×53·5	3,570·0	6×275 6×320 3×225	650	825	PF	1942	11·6, 33·0	1,587·098	26·21	8,382	995·7
126	Ironbridge	S	R	R.Rd.	200·0	—	4×50	2,525·0	2×250 5×270	375	750	PF, SF	1933	9·5, 33·0	542·408	21·50	6,896	401·4
127	Market Drayton	I	—	—	0·1	—	—	—	—	—	—	—	1932	0·48	0·015	24·91	176	—
128	Meaford 'A'	S	T	R.Rd.	120·0	—	4×30	1,440·0	6×240	600	825	PF	1948	11·8	837·029	25·82	8,755	444·8
129	Nechells 'A'	S	T	Rd.RB	98·7	—	—	1,056·0	3×150	300	700	CG, PF	1922	11·0	33·516	7·42	1,796	76·9
	'B'	S	T	R.Rd.	210·0	—	4×52·5	2,760·0	12×230	650	825	CG	1951	11·0	1,197·991	25·65	8,760	726·4
130	Ocker Hill	S	T	R.B.	60·0	2×30	2×30	900·0	5×180	600	850	CG	1947	33·0	227·439	24·04	7,236	161·0
131	Roushill	I	—	—	1·0	—	—	—	—	—	—	—	1928	0·45	0·008	2·75	171	—
132	Stafford	S	R	Rd.	6·0	—	—	107·0	—	170	525	CG	1925	6·6	3·889	8·65	1,260	6·7
133	Stoke	S	T	Rd.	31·0	—	—	360·0	—	200/250	640/650	CG	1919	6·6	35·349	13·74	2,872	23·8
134	Stourport 'A' H.P.	S	R	R.Rd.	125·0	—	3×30 1×35	1,456·0	8×182	625	825	CG	1931	11·0	380·005	22·93	5,892	252·0
	L.P.	S	R	R.Rd.	56·7	—	—	580·0	2×100	325	675	CG, RS	1926	33·0, 11·0	68·417	12·49	3,252	78·0
	'B' H.P.	S	R	R.Rd.	60·0	—	1×60	515·0	1×515	1,500	1,050	PF	1950	11·8	453·378	30·78	7,919	225·9
	L.P.	S	R	R.Rd.	60·0	—	1×60	525·0	1×525	1,250	950	PF	1954	11·8	5·996	20·96	312	4·4
135	Sutton Coldfield	S	P	Rd.	1·0	—	—	18·0	—	150	550	CG, HF	1927	0·46	0·197	4·98	225	0·6
136	Walsall	S	T	Rd.RB	180·0	—	6×30	2,160·0	12×180	600	850	CG	1949	33·0	701·757	24·65	8,222	496·3
137	Wolverhampton	S	T	B	30·0	—	1×30	480·0	4×120	420	825	CG	1942	6·6	124·485	20·49	5,143	105·9
138	Worcester H.P.	S	R	R	30·0	—	—	450·0	3×150	400	800	CG	1943	6·6	52·872	19·10	3,617	42·6
	L.P.	S	R	R	10·5	—	—	—	—	215	590	CG	1918	6·6	6·049	15·74	2,659	5·9
	SOUTH WALES DIVISION																	
139	Bridgend	S	T	R	2·0	—	—	25·5	—	150	480	HF	1927	6·6	0·787	6·82	606	1·3
140	Cardiff H.P.	S	R.T.	R	60·0	—	2×30	720·0	4×180	600	850	CG	1942	33·0	234·568	21·35	6,078	138·9
	L.P.	S	R.T.	R	27·6	—	—	320·0	—	200	588	CG	1922	6·6	26·145	10·01	2,475	33·6
141	Carmarthen Bay	S	S	R	165·0	3×60	2×52·5 1×60	1,680·0	7×240	940	925	PF	1953	11·8	757·819	27·70	8,618	340·0
142	Cyfarthfa	H	—	—	0·1	—	—	—	14·5	—	—	—	1931	0·6	0·212	—	5,555	—
143	Haverfordwest	I	—	—	8·5	—	—	—	—	—	—	—	1931	11·0	10·568	27·23	4,054	3·1
144	Lampeter	I	—	—	0·2	—	—	—	—	—	—	—	1912	0·24	0·066	19·62	718	—
145	Llandrindod Wells	I	—	—	0·2	—	—	—	—	—	—	—	1928	0·48	0·027	18·71	276	—
146	Llandyssul	I(H)	—	—	0·1	—	—	—	15	—	—	—	1910	0·25	0·072	18·80	4,547	—
147	Llanelly	S	S	R	25·0	—	—	280·0	—	250	700	CG	1923	6·6	40·600	13·85	3,381	34·1
148	Llynfi	S	T	R	120·0	—	4×30	1,200·0	4×300	650	900	PF	1943	11·0	763·367	25·77	8,760	378·9
149	Lydney	S	R.T.	R.Rd.	17·5	—	—	155·0	—	250	650	CG	1923	6·6	28·820	13·78	4,611	29·6
150	Milford Haven	I	—	—	0·8	—	—	—	—	—	—	—	1926	0·44	1·010	24·58	4,367	0·3
151	Monmouth	H	—	—	0·1	—	—	—	10	—	—	—	1923	3·0	0·138	—	2,078	—
152	Newport H.P.	S	R	R	60·0	—	2×30	600·0	2×150 2×180	600	850	CG	1941	6·2, 11·8	319·696	24·40	8,383	164·9
	L.P.	S	R	R	20·5	—	—	220·0	—	250	650	CG	1925	6·2	21·599	11·11	2,446	25·6
153	Penarth	S	T	Rd.	2·0	—	—	25·0	—	160	520	CG	1924	6·0	0·493	10·10	395	0·6
154	Pont-y-cafnau	H	—	—	0·2	—	—	—	38, 68	—	—	—	1929	0·6	0·894	—	7,428	—
155	Poncypridd	S	R	—	1·8	—	—	18·0	—	200	550	HF	1905	0·5	—	—	—	—
156	Tir John	S	S	R	155·5	—	2×30 2×41·5	1,880·0	4×230 4×240	250/600	795/825	PF	1931	6·6, 33·0	742·631	18·92	8,760	533·3
157	Upper Boat H.P.	S	R.T.	R	90·0	—	3×30	1,274·0	5×182 1×364	625	825	PF, CG	1939	11·0, 33·0	493·761	23·66	8,597	269·3
	L.P.	S	R.T.	R	65·0	—	—	480·0	—	325	725	CG	1924	11·0, 33·0	167·798	12·92	8,379	164·6
158	Uskmouth 'A'	S	R	R	240·0	2×60	4×60	2,880·0	8×360	900	900	PF	1952	11·8	1,160·635	28·57	8,760	546·9
	YORKSHIRE DIVISION																	
159	Barnsley	S	T	Rd.	3·0	—	—	75·0	—	150	516	CG	1924	3·3	1·332	8·07	628	2·2
160	Barugh	S	P.T.	Rd.	14·0	—	—	70·0	—	170	580	CG	1922	6·6	13·900	9·31	3,278	20·2
161	Blackburn Meadows	S	T	Rd.RB	185·0	—	2×30 2×50	2,120·0	3×100 9×160 2×190	580	800	TG, RS	1932	11·4	584·001	21·92	7,546	379·0
162	Bradford H.P.	S	T	R.Rd.	75·0	—	1×30	1,080·0	6×180	625	825	CG, RS	1942	6·6, 33·0	307·060	23·00	7,632	188·1
	L.P.	S	T	R.Rd.	52·5	—	1×30	315·0	—	190	754	RS, CG	1925	6·6	43·707	12·33	2,417	49·6
163	Doncaster 'A'	S	C	B	13·5	—	—	130·0	—	200	530/550	CG	1923	3·2	6·679	11·64	1,503	7·7
164	'B'	S	R	Rd.B.	60·0	2×30	2×30	720·0	4×180	600	850	TG	1953	11·0	244·281	24·92	7,402	135·3

Map Ref.	Name of Station	Type of Prime Mover	Type of Cooling	Method of Fuel Delivery	Total Installed Capacity of Generators MW	Extensions Planned or under Construction—Gen. Sets	Steam Gen. Sets 30 MW and above; Hydro above 10 MW	Total Boiler Capacity—k. lb/hr.; million cu ft for hydro storage	Boilers 100 k. lb/hr. and above; gross head in ft for hydro	Steam Conditions at Turbine Stop Valves lb/sq in	Steam Conditions at Turbine Stop Valves deg F	Type of Firing	Year of Commissioning of Oldest Existing Set	Generating Voltage—kV	Electricity Supplied from Station, 1954—Million kWh	Overall Thermal Efficiency, 1954	Time Generating, 1954—Hours	Fuel Consumed (all Types) Thousand Tons
	YORKSHIRE DIVISION *(continued)*																	
165	Ferrybridge 'A' H.P.	S	R	R.B.	130·0	—	2×42·5 1×45	1,840·0	8×130 4×200	600	825/850	CG	1939	10·5	663·885	23·48	8,732	405·5
	L.P.	S	R	R.B.	40·0	—	—	456·0	—	275	650	CG	1927	10·8	69·499	14·33	4,947	64·7
166	Gainsborough	I	—	—	0·3	—	—	—	—	—	—	—	1927	6·6	16·911	—	—	—
167	Grimsby	S	T	R	38·0	—	—	425·0	—	225	800	TG	1924	6·6	92·689	16·11	7,038	79·3
168	Halifax H.P.	S	T	R.Rd.	38·3	—	—	420·0	2×100 2×110	350	750	TG	1922	6·6	72·294	16·74	3,880	58·1
	L.P.	S	T	R.Rd.	10·0	—	—	58·0	—	200	640	CG	1925	6·6	0·592	6·73	252	1·2
169	Huddersfield H.P.	S	T	Rd.	30·0	1×30	1×30	360·0	2×180	600	850	TG	1953	11·8	174·676	25·59	7,538	92·5
	L.P.	S	T	Rd.	40·0	—	—	480·0	4×120	350	750	CG	1938	6·8	187·986	21·42	7,126	118·5
170	Keadby	S	R	R.Rd	300·0	1×60	5×60	2,750·0	5×550	900	900	PF	1952	11·0	1,104·500	27·87	8,756	571·1
171	Kirkstall H.P.	S	R.T.	Rd.RB	60·0	—	2×30	750·0	3×250	600	850	PF	1947	33·0	294·643	24·07	8,423	188·0
	L.P.	S	R.T.	Rd.RB	140·0	—	3×30	1,620·0	3×160 3×180 3×200	450	720	PF	1930	11·0, 33·0	258·425	19·47	5,407	195·4
172	Mexborough	S	R	R.Rd.	60·0	2×30	2×30	720·0	4×180	600	850	TG	1945	10·5	213·924	23·93	7,666	125·9
173	Neepsend	S	T	R.Rd.	160·0	—	2×30 2×50	1,940·0	5×160 6×190	600	825	TG, CG	1936	11·4	559·589	22·23	6,967	380·2
174	Rotherham	S	RCT	R.Rd.	160·0	—	2×30 1×50	1,800·0	10×180	600	850	CG, SS	1939	6·6, 11·0	682·225	23·81	8,453	408·0
175	Sculcoates (Hull)	S	T	R.Rd.	122·0	—	2×30	1,492·5	5×110 3×187·5 2×190	240/375	600/800	TG	1925	6·6, 22·0	331·686	21·12	8,248	225·5
176	Skelton Grange 'A'	S	R.T.	R	300·0	1×60	5×60	2,710·0	6×360 1×550	900	925	PF	1951	11·0	1,428·258	28·99	8,760	769·6
177	Tadcaster	I(H)	—	—	0·3	—	—	—	—	—	—	—	1912	0·5	—	—	—	—
178	Thornhill	S	R.T.	Rd.RB	195·0	—	1×30 3×45	2,320·0	8×200	400	750/825	TG	1932	10·5	608·348	22·83	8,421	368·7
179	Wakefield 'A'	S	R	Rd.	12·0	4×60	—	76·0	—	175	525	TG	1922	6·6	3·039	7·38	955	5·8
180	Whitehall Road	S	R	B	37·0	—	—	480·0	—	170	525	CG	1923	6·75	16·453	11·05	1,448	20·3
	NORTH EASTERN DIVISION																	
181	Ayresome	S	R	—	3·0	—	—	—	—	130	350	—	1934	2·9	10·750	13·02	8,038	—
182	Blaydon	S	T	—	1·1	—	—	—	—	190	480	—	1933	5·75	5·123	8·69	8,011	—
183	Carville	S	R	R	62·5	—	—	672·0	—	250	650	CG	1916	5·75	104·684	15·62	5,192	94·3
184	Close	S	R	Rd.	9·7	—	—	195·0	—	200	600	CG	1902	6·0	9·312	9·23	2,604	12·3
185	Dartington	S	T	R	60·0	—	—	720·0	6×120	400	750	CG	1940	6·3	192·159	20·89	6,279	121·6
186	Dunston 'A'	S	R	R.Rd.	45·0	—	—	509·5	—	190	600	CG	1920	5·75	57·206	13·52	3,217	60·5
	'B' I	S	R	R.Rd.	202·5	—	4×50	1,920·0	8×105 8×135	600	800	CG, PF	1932	13·5	1,021·722	24·62	8,760	596·0
	II	S	R	R.Rd.	100·0	—	2×50	820·0	2×410	600	850	PF	1949	11·0	722·061	29·89	8,729	328·8
187	Harrogate H.P.	S	P	Rd.	9·5	—	—	100·0	—	175	600	CG	1928	3·46, 11·0	4·132	12·57	818	4·5
	L.P.	S	P	Rd.	6·4	—	—	24·0	—	300	700	SS	1922	3·66				
188	Horden	S	T	—	6·0	—	—	—	—	250	650	—	1934	2·75	32·169	16·36	8,760	—
189	Linton Lock (York)	H	—	—	0·7	—	—	—	12	—	—	—	1923	6·6	1·446	—	4,246	—
190	North Tees 'A' & 'B'	S	R	R	110·0	—	—	1,415·0	2×180	450	650	CG, PF	1921	11·5	219·694	16·88	5,120	176·0
	'C'	S	R	S	240·0	—	4×60	2,520·0	7×360	900	925	PF	1951	11·0	1,180·857	28·98	8,760	604·8
191	Scarborough	S	T.P.	Rd.	9·4	—	—	80·0	—	250	700	CG	1928	6·6	10·018	12·46	2,476	11·0
192	South Shields	S	R	B	10·5	—	—	180·0	—	160/230	500/600	CG	1921	2·25	7·631	11·54	1,469	9·4
193	Stella South	S	R	R	60·0	4×60	1×60	550·0	1×550	900	900	PF	1954	11·8	0·496	9·74	80	0·6
194	Sunderland H.P.	S	T	R	40·0	—	—	363·0	3×121	400	800	CG	1942	5·0	141·866	20·75	6,591	90·2
	L.P.	S	T	R	20·0	—	—	300·0	—	250	650	CG	1925	5·25	11·853	8·52	1,678	18·3
195	York, Foss Islands, H.P.	S	R.T.	R	20·0	1×20	—	200·0	2×100	400	750	CG	1941	11·0	38·821	18·87	3,262	30·1
	L.P.	S	R.T.	R	6·0	—	—	70·0	—	190	583	CG	1928	3·3	6·353	8·88	2,271	10·6
	NORTH WEST, MERSEYSIDE AND NORTH WALES DIVISION																	
196	Aberystwyth	I	—	—	4·9	—	—	—	—	—	—	—	1915	6·6	12·038	31·42	8,758	3·0
197	Accrington	S	R.T.	Rd.	15·7	—	—	160·0	—	195	600	CG	1921	6·6	15·344	10·56	2,764	18·8
198	Agecroft 'A'	S	R	Rd.	58·1	—	—	550·0	4×315	300	700	CG	1924	6·6	38·963	14·87	1,727	37·1
199	'B' L.P.	S	T	R	105·0	—	2×52·5	1,260·0	—	600	850	PF	1950	33·0	627·757	27·06	8,760	330·9
200	Alderley Edge	I	—	—	2·0	1×2	—	—	—	—	—	—	1954	11·0	—	—	—	—
201	Barrow	S	T	R	23·0	—	—	265·0	—	195	650	TG, CG	1914	6·6	47·900	15·23	4,795	31·5
202	Barton	S	C	Rd.	161·5	—	1×41 1×51·5	1,775·0	2×125 1×130 1×140 2×200	350	700, 825	CG, PF	1923	6·6, 33·0	277·084	16·94	4,417	221·6
203	Birkdale	I	—	—	0·6	—	—	—	—	—	—	—	1908	0·48	0·053	19·18	212	—
204	Blackburn	S	T	R.Rd.	150·0	—	1×30 3×40	1,650·0	11×150	600	850	CG	1942	33·0	323·109	21·72	6,446	204·1
205	Blackpool	S	T	Rd.	18·7	—	—	90·0	—	245	600/650	RS, CG	1923	6·6	1·348	6·81	345	2·8
206	Bold 'A'	S	T	Rd.	60·0	2×30	2×30	600·0	2×300	600	850	PF	1953	11·8	136·737	25·04	5,343	77·7
207	Bolton H.P.	S	RPT	R	93·7	—	3×31·25	990·0	6×165	400	800	CG	1941	6·6, 11·5	172·281	20·70	4,602	114·5
	L.P.	S	RPT	R	13·7	—	—	—	—	200	538	—	1923	6·6	—	—	—	—
208	Bromborough	S	R	R	200·0	—	4×50	2,400·0	8×300	900	900	PF	1951	11·0	1,320·061	29·23	8,760	624·7
209	Burnley	S	RCT	Rd.	6·0	—	—	108·0	—	155	518	CG	1905	6·6	1·610	7·42	472	2·6
210	Bury H.P.	S	R.T.	R	10·8	—	—	120·0	—	300	700	CG	1930	6·6	20·827	16·70	3,062	16·7
	L.P.	S	R.T.	R	16·0	—	—	158·0	—	200	580	CG	1921	6·6	4·138	9·87	760	5·6
211	Buxton	I	—	—	4·0	—	—	—	—	—	—	—	1954	6·6	—	—	—	—
212	Carlisle H.P.	S	R	R.Rd.	60·7	—	2×30	750·0	5×150	600	825	CG	1943	11·0	334·098	23·31	8,711	195·3
	L.P.	S	R	R.Rd.	26·1	—	—	199·0	—	250	650	CG	1923	3·3, 11·0	31·889	13·39	3,575	33·0
213	Carrington	S	R	R	120·0	2×60	2×60	1,440·0	4×360	900	900	PF	1953	11·8	556·801	27·98	8,104	299·5
214	Chadderton 'A	S	T	R	41·2	—	—	400·0	—	250	650	CG	1929	6·6	53·246	16·27	3,167	45·8
	'B'	S	T	R.Rd.	120·0	2×60	2×60	1,440·0	4×360	900	900	PF	1953	11·8	348·054	26·54	6,167	182·9
215	Clarence Dock H.P.	S	R	R	257·5	—	5×51·5	2,850·0	6×200 1×250 4×350	600	800	CG, PF	1937	33·0	1,307·431	24·83	8,760	772·6
	L.P.	S	R	R	102·5	—	2×51·25	1,440·0	4×160 4×200	400	750	CG	1931	7·25	232·177	20·22	5,162	171·6
216	Coniston	H	—	—	0·3	—	—	—	210	—	—	—	1932	0·48	1·201	—	8,174	—
217	Connah's Quay	S	T	R.Rd.	60·0	4×30	2×30	600·0	2×300	600	850	PF	1953	11·8	174·920	25·93	5,663	98·5

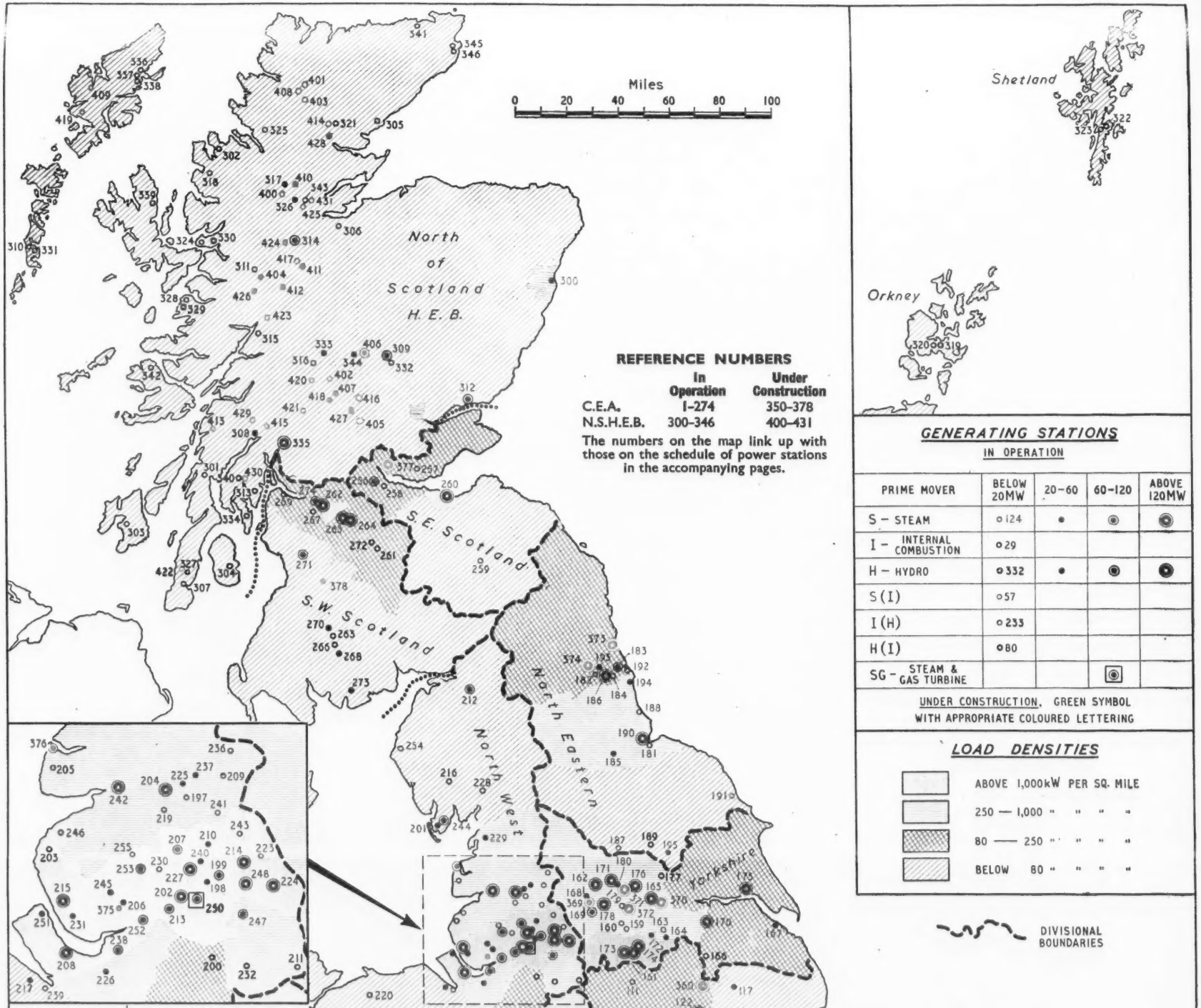
Map Ref.	Name of Station	Type of Prime Mover	Type of Cooling	Method of Fuel Delivery	Total Installed Capacity of Generators MW	Extensions Planned or under Construction—Gen. Sets	Steam Gen. Sets 30 MW and above; Hydro above 10 MW	Total Boiler Capacity—k. lb/hr.; million cu ft for hydro storage	Boilers 100 k. lb/hr. and above; gross head in ft for hydro	Steam Conditions at Turbine Stop Valves lb/sq in	Steam Conditions at Turbine Stop Valves deg F	Type of Firing	Year of Commissioning of Oldest Existing Set	Generating Voltage—kV	Electricity Supplied from Station, 1954—Million kWh	Overall Thermal Efficiency, 1954	Time Generating, 1954—Hours	Fuel Consumed (all Types) Thousand Tons
NORTH WEST, MERSEYSIDE AND NORTH WALES DIVISION *(continued)*																		
218	Cwm Dyli	H	—	—	6·5	—	—	—	1,100	—	—	—	1906	10·0, 4·8	13·677	—	4,793	—
219	Darwin	S	R	Rd.	2·3	—	—	24·0	—	155	500	SS	1912	3·0	0·210	5·56	223	0·5
220	Dolgarrog	H	—	—	17·7	—	—	—	1,130	—	—	—	1919	6·6	70·597	—	8,752	—
221	Dolgelly	H(I)	—	—	0·1	—	—	—	250	—	—	—	1934	0·4	0·702	28·52	7,122	0·1
222	Ffestiniog	H	—	—	0·6	—	—	—	170	—	—	—	1907	0·4	3·846	—	8,437	—
223	Greenhill	S	T	R	19·8	—	—	210·0	—	200	560	CG	1921	6·3	18·999	11·14	2,595	22·7
224	Hartshead H.P.	S	T.P.	R.Rd.	94·2	—	1×31·25 2×31·5	1,050·0	7×150	620	840	CG	1939	6·6	415·156	24·23	8,760	252·1
	L.P.	S	T.P.	R.Rd.	37·5	—	—	360·0	—	275	675	CG	1931	6·6	49·896	13·31	3,276	54·8
225	Huncoat	S	T	R	60·0	3×30	2×30	915·0	3×305	600	850	PF	1952	11·0	427·892	27·75	8,721	200·4
226	Ince	S	T	R.Rd.	60·0	3×60	1×60	550·0	1×550	900	900	PF	1954	11·8	2·713	16·45	187	2·2
227	Kearsley H.P.	S	R.T.	R	207·2	—	2×51·6 2×52	2,768·0	16×173	600	800	CG, SS	1936	33·0	943·806	25·23	8,760	521·4
	L.P.	S	R.T.	R	64·9	—	2×32·25	760·0	—	300	675	CG	1929	11·0	82·427	19·25	2,749	58·0
228	Kendal	I	—	—	0·8	2×2	—	—	—	—	—	—	1928	6·3	0·022	6·27	145	—
229	Lancaster H.P.	S	R	R.Rd.	41·6	—	—	410·0	2×205	450	800	CG	1942	6·6	133·183	23·32	5,835	78·0
	L.P.	S	R	R.Rd.	10·8	—	—	234·0	—	200	538	CG	1916	6·6	5·008	10·62	886	6·4
230	Leigh	S	C	Rd.	4·0	—	—	71·0	—	175/180	510	—	1915	6·6	0·689	7·03	372	1·3
231	Lister Drive	S	T	R	50·7	—	—	610·0	2×125	275	675	CG, PF	1926	6·3	49·728	13·34	2,293	53·9
232	Macclesfield	I	—	—	1·2	1×2	—	—	—	—	—	—	1914	0·48	0·129	19·22	195	0·1
233	Machynlleth	I(H)	—	—	0·5	3×1·33	—	—	40	—	—	—	1932	0·42	1·393	29·45	6,457	0·3
234	Maentwrog	H	—	—	24·0	—	—	—	630	—	—	—	1928	6·6	48·005	—	4,388	—
235	Marchwiel	S	T	R	12·1	—	—	200·0	—	230	630	CG	1941	11·0	21·733	14·98	2,344	20·1
236	Nelson	S	C	Rd.	12·7	—	—	96·0	—	190	550	CG	1922	6·6	2·578	10·97	669	3·3
237	Padiham	S	R	R	31·4	—	—	322·0	—	240	620	CG	1927	11·0	35·925	15·60	3,041	30·5
238	Percival Lane 'A'	S	C	R	25·0	—	—	280·0	—	250	650	CG	1921	6·45	12·003	11·85	1,006	14·1
	'B'	S	C	R	90·0	—	3×30	1,125·0	6×187·5	400	800	CG	1940	11·0	285·243	22·28	6,380	181·3
239	Queensferry	S	P	Rd.	5·5	—	—	104·0	—	160	500	SS	1916	0·44	1·133	4·36	377	3·3
240	Radcliffe	S	R	R	53·5	—	—	480·0	—	150	500	CG	1921	11·0	53·031	13·52	3,028	51·0
241	Rawtenstall	S	R.T.	Rd.	12·5	—	—	80·0	—	200	600	CG	1921	6·6	7·011	12·91	7,509	6·7
242	Ribble 'A'	S	R	Rd.	55·1	—	—	462·0	—	300	700	CG	1924	6·6	47·004	10·18	2,761	66·4
	'B'	S	R	R.Rd.	126·0	—	4×31·5	1,496·0	8×187	600	850	TG	1942	11·0	579·478	23·51	8,095	354·2
243	Rochdale	S	R	Rd.	6·0	—	—	62·0	—	180	540	CG	1915	5·8	0·780	6·24	314	1·7
244	Roosecote	S	S	R	120·0	—	4×30	1,200·0	4×300	600	850	PF	1953	11·8	287 037	26·90	8,409	148·9
245	St. Helens	S	T	R	24·0	—	—	190·0	—	250	700	CG	1921	6·6	23·702	11·75	3,272	28·7
246	Southport	S	T	R	17·2	—	—	219·0	—	250	700	CG, OF	1921	6·6	13·486	14·61	2,067	12·9
247	Stockport H.P.	S	T	Rd.	30·0	—	1×30	300·0	1×300	600	825	PF	1943	6·6	118·803	25·05	6,554	63·9
	I.P.	S	R.T.	Rd.	30·0	—	1×30	450·0	3×150	400	800	CG	1940	6·6	66·928	17·41	3,625	53·4
	L.P.	S	R.T.	Rd.	32·5	—	—	120·0	—	210	650	CG	1926	6·6	5·564	4·43	707	17·6
248	Stuart Street H.P.	S	T	R	61·5	—	1×61·5	800·0	2×400	600	850	PF	1949	33·0	408·585	26·45	8,418	206·6
	L.P.	S	T	R	118·2	—	3×30·75	1,500·0	2×100 10×130	355	700	CG	1936	6·6	310·131	18·03	5,799	246·1
249	Towyn	I(H)	—	—	0·9	—	—	—	50	—	—	—	1935	0·42	1·646	28·07	5,353	0·5
250	Trafford	S(G)	C	Rd.	75·0	—	2×30	740·0	2×150 2×220	400	800	CG	1941	33·0	318·705	24·30	7,870	178·8
251	Wallasey	S	S	R.Rd.	22·5	—	—	300·0	—	190	605	CG, PF, OF	1923	6·6	25·611	14·50	2,914	23·7
252	Warrington	S	R	R	90·0	—	1×30	1,000·0	5×200	400	800	CG	1942	6·6	273·989	21·67	6,449	178·6
253	Westwood	S	T	Rd.	120·0	—	4×30	1,500·0	5×300	600	850	PF	1951	11·0	555·903	24·33	7,954	320·0
254	Whitehaven	S	S	R	1·2	—	—	32·5	—	150	460	CG	1925	0·43	0·217	6·07	489	0·5
255	Wigan	S	C	Rd.	10·0	—	—	120·0	—	200	600	CG	1920	6·6	3·957	10·24	663	5·3
SOUTH EAST SCOTLAND DIVISION																		
256	Bonnybridge H.P.	S	T	R	40·0	—	—	480·0	4×120	350	750	TG	1944	22·0	198·424	20·94	7,394	136·1
	L.P.	S	T	R	30·0	—	—	210·0	—	250	650	TG	1924	6·6	45·387	14·72	3,736	43·2
257	Dunfermline H.P.	S	R	R	9·0	1×12·5	—	100·0	—	250	650	CG	1922	6·6	19·563	12·92	2,729	23·1
	L.P.	S	R	R	4·0	—	—	60·0	—	150	500	CG	1919	6·6				
258	Falkirk	S	T	Rd.	7·5	—	—	87·5	—	165/200	573/725	CG	1921	6·6	11·021	12·07	3,278	14·3
259	Galashiels	S	R	R	5·6	—	—	70·0	—	200	650	CG	1924	6·6	10·783	16·52	2,944	10·5
260	Portobello H.P.	S	S	R.Rd.	120·0	1×60	2×60	1,080·0	2×540	1,350	950	PF	1951	13·2	505·825	31·27	8,202	233·8
	L.P.	S	S	R.Rd.	92·5	—	1×30 2×31·25	720·0	2×120	290	690	CG	1929	6·6	264·875	20·29	7,444	198·8
SOUTH WEST SCOTLAND DIVISION																		
261	Bonnington	H	—	—	9·8	—	—	—	189	—	—	—	1927	11·0	0·067	—	8,759	—
262	Braehead	S	R	R.Rd.	200·0	—	4×50	2,100·0	7×300	900	900	PF	1951	11·0	1,249·598	28·37	8,760	640·9
263	Carsfad	H	—	—	12·0	—	—	30·0	65	—	—	—	1936	11·0	0·029	—	4,373	—
264	Clyde Mill H.P.	S	R.T	R	60·0	2×30	2×30	720·0	4×180	600	850	TG	1950	11·0	345·956	26·95	8,306	184·2
	I.P.	S	R	R	120·0	—	4×30	1,288·0	—	385	775	CG	1935	11·0	498·911	23·23	8,421	305·4
	L.P.	S	R	R	37·5	—	—	396·0	—	200	590	CG	1921	11·0	42·137	13·00	3,057	44·9
265	Dalmarnock H.P.	S	R	R	100·0	2×60	2×50	1,200·0	6×200	600	825	CG	1937	20·0	302·836	23·67	7,777	187·2
	L.P.	S	R	R	37·5	—	—	560·0	—	270	700	CG	1926	6·5	68·683	13·24	5,296	75·6
266	Earlstoun	H	—	—	12·0	—	—	44·0	67	—	—	—	1936	11·0	0·035	—	4,407	—
267	Fergusiie	S	C.P.	Rd.	16·2	—	—	270·0	—	250	620	OF, CG	1923	0·525	0·600	8·65	199	0·7
268	Glenlee	H	—	—	25·0	—	2×12	1,250·0	380	—	—	—	1935	11·0	0·075	—	3,856	—
269	Greenock	S	R.T.	R	8·0	—	—	174·0	—	190	520	TG, CG	1911	3·3	0·764	4·96	200	2·1
270	Kendoon	H	—	—	21·0	—	2×10·5	40·0	150	—	—	—	1936	11·0	0·070	—	4,569	—
271	Kilmarnock H.P.	S	T	R	60·0	—	2×30	750·0	5×150	400	800	CG	1940	22·0	185·382	19·34	6,318	139·0
	L.P.	S	R	R	25·0	—	—	260·0	—	250	650	CG	1922	3·3	5·918	9·45	1,131	8·8
272	Stonebyres	H	—	—	5·7	—	—	—	97·5	—	—	—	1927	11·0	0·033	—	8,669	—
273	Tongland	H	—	—	33·2	—	3×11	30·0	106	—	—	—	1935	11·0	0·112	—	5,538	—
274	Yoker H.P.	S	R	R	60·0	—	2×30	720·0	—	385	780	CG	1937	11·0	228·970	22·61	6,837	148·2
	L.P.	S	R	R	40·0	—	—	480·0	—	220	675	CG	1929	11·0	93·337	16·58	4,302	81·4
NORTH OF SCOTLAND HYDRO-ELECTRIC BOARD																		
300	Aberdeen	S	R	R	57·25	—	—	57,250	12	265	700	S	1913	6·6	111·5			
301	Ardrishaig	I	—	Rd.	1·0	—	—	—	—	—	—	—	1937	0·415	0·071			
302	Aultbea	I	—	Rd.	0·5	—	—	—	—	—	—	—	1950	0·415	0·001			
303	Bowmore	I	—	S.Rd.	2·2	—	—	—	—	—	—	—	1948	0·415	3·235			
304	Brodrick	I(H)	—	B	3·1	—	—	—	700	—	—	—	1946	0·415	4·047			
305	Bora	I	—	Rd.	0·4	—	—	—	—	—	—	—	1939	0·414	0·007			

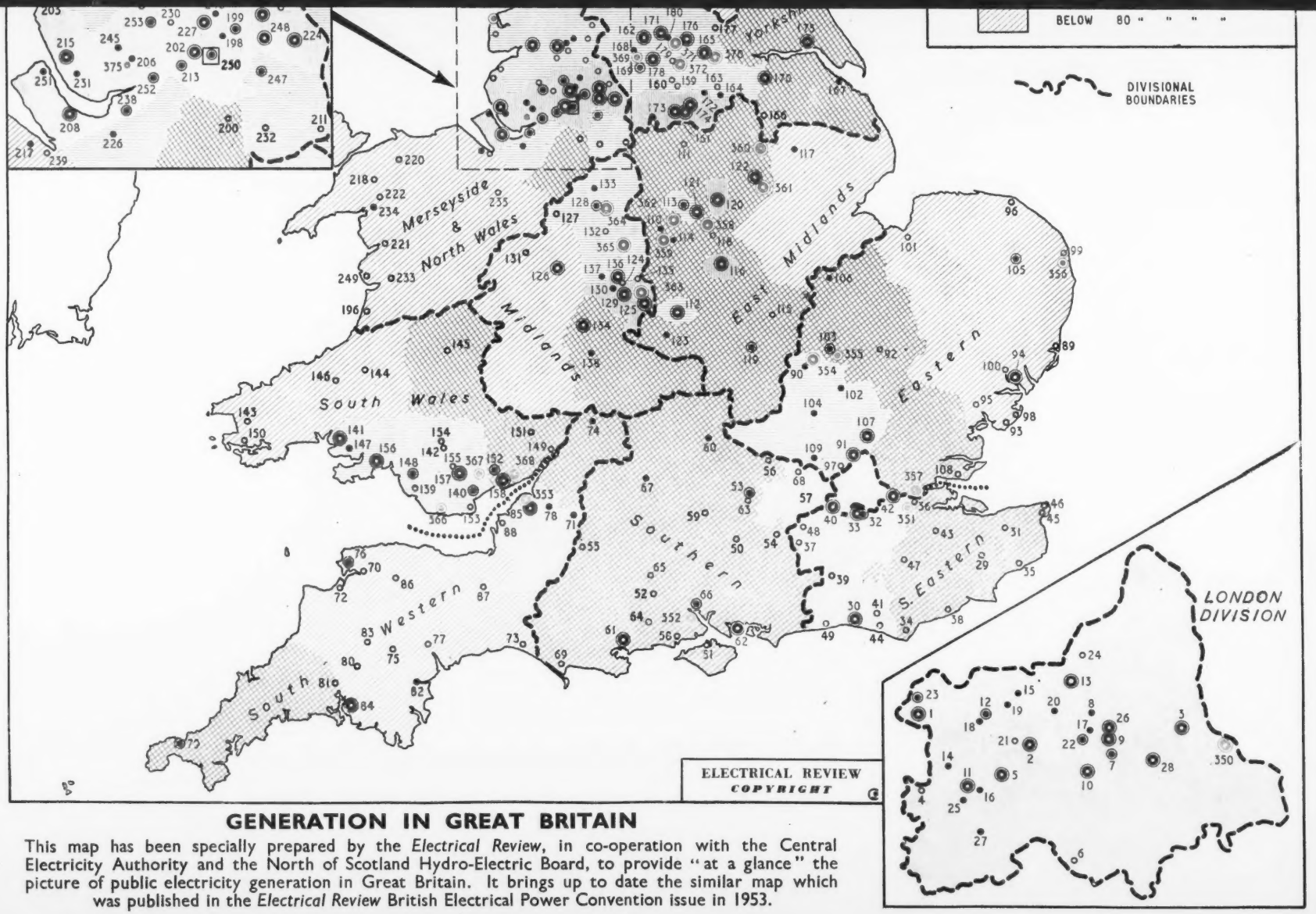
Map Ref.	Name of Station	Type of Prime Mover	Type of Cooling	Method of Fuel Delivery	Total Installed Capacity of Generators MW	Extensions Planned or under Construction — Gen. Sets	Steam Gen. Sets 30 MW and above; Hydro above 10 MW	Total Boiler Capacity — k. lb. hr.; million cu ft for hydro storage	Boilers 100 k. lb hr. and above; gross head in ft for hydro	Steam Conditions at Turbine Stop Valves lb/sqin	Steam Conditions at Turbine Stop Valves deg F	Type of Firing	Year of Commissioning of Oldest Existing Set	Generating Voltage — kV	Electricity Supplied from Station, 1954 — Million kWh	Overall Thermal Efficiency, 1954	Time Generating, 1954 — Hours	Fuel Consumed (all Types) Thousand Tons
NORTH OF SCOTLAND HYDRO-ELECTRIC BOARD (*continued*)																		
306	Bught	H	—	—	0·1	—	—	—	12	—	—	—	1929	0·415	0·6			
307	Campbeltown	I	—	B	3·1	—	—	—	—	—	—	—	1944	3·3	2·563			
308	Clachan	H	—	—	45·0	—	1 × 40	800	—	—	—	—	—	—	—			
309	Clunie	H	—	—	61·2	—	3 × 20·4	11,200	173	—	—	—	1950	11·0	182·0			
310	Daliburgh	I	—	—	0·9	—	—	—	—	—	—	—	—	—	0·061			
311	Doe	H	—	—	—	—	—	—	—	—	—	—	—	—	—			
312	Dundee	S	R	R	63·6	1 × 12·5	—	63,625	9	350 180	750 600	S	1914	11·0 6·6 3·3	215·7			
313	Dunoon	I	—	B	2·3	—	—	—	—	—	—	—	1929	0·415	0·217			
314	Fasnakyle	H	—	—	66·0	—	—	7,500	522	—	—	—	1951	11·0	240·4			
315	Fort William	I	—	Rd.	0·4	—	—	—	—	—	—	—	1948	0·415	0·004			
316	Gaur	H	—	—	6·4	—	—	270	92	—	—	—	1953	0·415	20·6			
317	Grudie Bridge	H	—	—	24·0	—	—	7,000	537	—	—	—	1950	11·0	82·0			
318	Kerry Falls (Gairloch)	H	—	—	1·2	—	—	140	185	—	—	—	1952	0·415	1·8			
319	Kirkwall (Old)	I	—	Rd.	0·7	—	—	—	—	—	—	—	1937	0·415 0·440d.c.	—			
320	Kirkwall (New)	I	—	S	5·0	—	—	—	—	—	—	—	1950	4·4 0·415 11·0	0·001			
321	Lairg	I	—	Rd.	0·2	—	—	—	—	—	—	—	1930	0·415	0·009			
322	Lerwick (Old)	I	—	Rd.	0·8	—	—	—	—	—	—	—	1937	0·415 11·0	0·001			
323	Lerwick (New)	I	—	S	4·2	—	—	—	—	—	—	—	1952	11·0	8·9			
324	Lochalsh	I	—	Rd.	0·7	—	—	—	—	—	—	—	1946	0·415	0·019			
325	Loch Dubh	H	—	—	1·2	—	—	200	543	—	—	—	1954	0·415	0·7			
326	Luichart	H	—	—	24·0	—	2 × 12·0	12,000	185	—	—	—	1954	11·0	40·8			
327	Lussa	H	—	—	2·4	—	—	260	380	—	—	—	1952	11·0	9·5			
328	Mallaig	I	—	R	0·4	—	—	—	—	—	—	—	1946	0·415	0·004			
329	Morar	H	—	—	0·8	—	—	—	—	—	—	—	—	—	—			
330	Nostie Bridge (Lochalsh)	H	—	—	1·3	—	—	15	490	—	—	—	1948	0·415	3·3			
331	Orosay	I	—	—	0·4	—	—	—	—	—	—	—	—	—	—			
332	Pitlochry	H	—	—	15·0	—	—	11,300	—	—	—	—	1950	11·0	68·8			
333	Rannoch	H	—	—	48·0	—	3 × 16	7,500	512	—	—	—	1930	11·0	209·4			
334	Rothesay	I	—	B	2·1	—	—	—	—	—	—	—	1932	6·6 11·0 0·480d.c.	0·111			
335	Sloy	H	—	—	130·0	—	4 × 32·5	1,240	910	—	—	—	1950	11·0	156·9			
336	Stornoway (Airfield)	I	—	Rd.	0·7	—	—	—	—	—	—	—	1947	0·415	0·057			
337	Stornoway (Rope-work Road)	I	—	Rd.	0·8	—	—	—	—	—	—	—	1932	0·480d.c. 0·451 3·3 11·0	0·044			
338	Stornoway (New)	I	—	S	5·6	—	—	—	—	—	—	—	1951	11·0	10·6			
339	Storr Lochs	H	—	—	1·9	—	—	190	447	—	—	—	1952	3·3	4·9			
340	Striven	H	—	—	6·0	—	—	440	403	—	—	—	1949	3·3	20·7			
341	Thurso	I	—	Rd.	1·0	—	—	—	—	—	—	—	1935	0·415	0·031			
342	Tobermory	I(H)	—	—	1·2	—	—	—	—	—	—	—	—	—	0·431			
343	Torr Achilty	H	—	—	7·5	—	—	12,100	—	—	—	—	1954	11·0	1·5			
344	Tummel Bridge	H	—	—	34·0	—	2 × 17	9,400	173	—	—	—	1933	11·0	137·2			
345	Wick (Old)	I	—	Rd.	1·1	—	—	—	—	—	—	—	1928	0·415 3·3	0·289			
346	Wick (New)	I	—	Rd.	3·6	—	—	—	—	—	—	—	1951	0·460d.c. 11·0	11·9			

INFORMATION NOT AVAILABLE

GENERATING STATIONS UNDER CONSTRUCTION OR PLANNED

Map Ref.	Station	Type of Prime Mover	Planned Capacity MW
	C.E.A. STATIONS		
350	Belvedere	S	240
351	Northfleet	S	120
352	Marchwood	S	360
353	Portishead 'B'	S	300
354	Goldington	S	180
355	Little Barford 'B'	S	120
356	South Denes	S	120
357	Tilbury 'A'	S	360
358	Castle Donington	S	600
359	Drakelow 'B'	S	240
360	High Marnham	S	200
361	Staythorpe 'B'	S	180
362	Willington 'A'	S	400
363	Hams Hall 'C'	S	360
364	Meaford 'B'	S	240
365	Rugeley	S	180
366	Aberthaw	S	100
367	Rogerstone	S	120
368	Uskmouth 'B'	S	180
369	Elland	S	120
370	Ferrybridge 'B'	S	300
371	Skelton Grange 'B'	S	180
372	Wakefield 'B'	S	240
373	Blyth	S	360
374	Stella North	S	240
375	Bold 'B'	S	60
376	Fleetwood	S	90
377	Kincardine	S	240
378	Barony	S	60
	NORTH OF SCOTLAND HYDRO-ELECTRIC BOARD		
400	Achanalt	H	2·0
401	Ben Hee	H	5·0
402	Cashlie	H	11·0
403	Cassley	H	10·0
404	Ceannacroc	H	20·0
405	Dalchonzie	H	3·5
406	Errochty	H	75·0
407	Finlarig	H	30·0
408	Garvault	H	1·0
409	Gisla	H	0·6
410	Glascarnoch	H	24·0
411	Glenmoriston	H	32·0
412	Invergarry	H	20·0
413	Kilmelfort	H	2·0
414	Lairg	H	3·5
415	Lairige	H	6·0
416	Lednock	H	2·0
417	Livishie	H	9·0
418	Lochay	H	45·0
419	Loch Chliostair	H	0·7
420	Lubreoch	H	3·0
421	Luib	H	6·0
422	Lussa (ext.)	H	—
423	Mucomir	H	1·5
424	Mullardoch	H	2·4
425	Orrin	H	18·0
426	Quoich	H	22·0
427	St. Fillans	H	21·0
428	Shin	H	24·0
429	Sron Mhor	H	5·0
430	Striven (ext.)	H	—
431	Torr Achilty	H	7·5


Miles
0 20 40 60 80 100
North of Scotland H.E.B.
S.E. Scotland
S.W. Scotland
North Eastern
North West
Yorkshire
Shetland
Orkney
REFERENCE NUMBERS
In Operation
Under Construction
C.E.A. 1-274 350-378
N.S.H.E.B. 300-346 400-431
The numbers on the map link up with those on the schedule of power stations in the accompanying pages.
GENERATING STATIONS
IN OPERATION
PRIME MOVER
BELOW 20MW
20-60
60-120
ABOVE 120MW
S - STEAM
I - INTERNAL COMBUSTION
H - HYDRO
S(I)
I(H)
H(I)
SG - STEAM & GAS TURBINE
UNDER CONSTRUCTION, GREEN SYMBOL WITH APPROPRIATE COLOURED LETTERING
LOAD DENSITIES
ABOVE 1,000kW PER SQ. MILE
250 — 1,000 " " " "
80 — 250 " " " "
BELOW 80 " " " "
DIVISIONAL BOUNDARIES



GENERATION IN GREAT BRITAIN

This map has been specially prepared by the *Electrical Review*, in co-operation with the Central Electricity Authority and the North of Scotland Hydro-Electric Board, to provide "at a glance" the picture of public electricity generation in Great Britain. It brings up to date the similar map which was published in the *Electrical Review* British Electrical Power Convention issue in 1953.

was published in the *Electrical Review* British Electrical Power Convention issue in 1953.

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VIEWS on the NEWS

By REFLECTOR

WHEN the railway strike began the Southern Region electric services ceased immediately because the motormen were members of the Association of Locomotive Engineers and Firemen (strange though that may seem). Great inconvenience was caused to the many thousands of what the Americans call " commuters " who travel to work on the Southern system. But when the strike was called off one of the advantages of electrical operation became apparent at once: the services, unlike the steam-operated sections, returned to normal operation in a very short time. So short in fact that for the first day the trains were running half-filled because the passengers could not believe that normality could be regained so soon.

* * *

Although the Electricity Act, 1947, empowers the Central Electricity Authority to manufacture " electrical plant and electrical fittings " this power is not specifically extended to the Area Boards which may " sell, hire or otherwise supply electrical fittings." Apparently if the Boards cannot themselves manufacture appliances they can design them and have them specially made. So far as I am aware the first instance of this has been provided by the South Western Electricity Board which has registered a trade mark for a kettle, designed the appliance and arranged with a manufacturing company to produce it. It is said to include all the best features of the electric kettle, but surely there are already a number of designs meeting this specification from which the Board could choose.

* * *

I have already commented on the inordinate importance placed on television to the detriment of more essential things. The latest addition to the dicta on this subject comes from Mrs. Braddock, M.P., who is reported to have said: —

> " The basic insecurity the workers feel is this: they are haunted by the spectre of the van driving up to the door to take away the TV set."

To make circuses, not bread, the basis of security seems to me to be a sad reflection upon the spirit of the age.

* * *

Warnings by some of the Electricity Boards to farmers of the care needed in moving equipment about farms served by overhead lines have failed to prevent entirely accidents caused by the fouling of the lines. Another case of this kind is reported from a farm at Ramsey, near Harwich, where a man was killed when a stack elevator came into contact with an overhead line. An incident somewhat similar in character occurred recently at Burwain Lake, Foulbridge, near Colne (Lancs.). In this case the metal mast of a 15ft sailing dinghy collided with a 6,600 V line and two men were killed. The circumstances are obscure but it appears that the men were moving the craft when it slipped down an embankment and fouled the line, causing the dinghy to burn. It is difficult to see how such accidents can be prevented, apart from the issuing or posting of warnings which was done in this case. The forcing of greater heights upon the supply authorities, as suggested by the coroner at the inquest on the two men, would be an expensive method of guarding against very infrequent occurrences.

* * *

By its recent change of name the Central Electricity Authority avoids initial confusion with British European Airways but there are still many other sets of initials which apply to more than one body. Visitors to Ireland will see references to C.I.E. all over the place, mainly on various kinds of vehicles. This has nothing to do with the Commission International d'Eclairage (International Commission on Illumination) which has just held its thirteenth session in Zürich. It relates to the authority Coras Iompair Eireann which runs the passenger and goods transport services—railways, buses, etc.—in the Irish Republic.

* * *

Urban residents take the blessings of electricity for granted; everybody has it and until there is a breakdown there is little consciousness of what it really means to them. It is otherwise when electricity comes to an isolated village —at least for a considerable time—and the switching-on ceremony is really something. For instance, at Kelston, three miles from Bath, when the supply was inaugurated recently not only were the church and a local mansion (Kelston Park) floodlighted, a joyous peal of bells rang out from the church. This scheme was a part of the extensive activities of the South Western Electricity Board in its predominantly rural area.

* * *

The *Eastern Electricity Magazine* quotes the following from an instruction given by a service centre to a refrigerator workshop: —

> " Consumer has moved refrigerator recently and is now making peculiar noises."

* * *

A single-innings electrical cricket match was reported in the *Electrical Review* of 27th June, 1885. It was played at Chelmsford between a team of younger members of the " Dynamicables " and the " Arcadians," a side composed of pupils at R. E. Crompton & Co.'s works. The result was a win for the home team by 59 runs. R. E. Crompton played for the visitors but was out for a " duck." Among other names in the " Dynamicables " team I notice the name of " S. F. Ferranti " (who made three runs) and there is a further reference to " S. L. Ferranti." I suppose this must have been Dr. S. Z. de Ferranti, but the *Review* reporter failed to get it right in two shots. Before the match the visitors were shown over the Arc Works by R. E. Crompton and

> " after dining together at the Saracen's Head Hotel, Mr. Crompton, in the absence of Lord Thurlow, taking the chair, the party left for London, a powerful electric searchlight being thrown on the train from the Arc Works as it steamed away to Liverpool Street."

LETTERS TO THE EDITOR

Letters should bear the writers' names and addresses, not necessarily for publication. Responsibility cannot be accepted for the opinions expressed by correspondents.

The Power Engineer's Status

IN reply to Mr. Warren (Nalgo) it appears obvious that he has not had personal experience in the electricity supply industry.

In the case mentioned the district senior clerk would be responsible only for routine matters, and in any event would appear to be under direct supervision of a district manager. Further investigation would indicate to Mr. Warren that the Board concerned employs *qualified* secretaries and accountants.

No doubt the third assistant engineer will receive instructions from the district engineer on normal duties, but as he has to carry out stand-by and emergency duties there will be many occasions when he has to make his own decisions. He therefore has a heavy responsibility for the lives of persons under his charge in addition to the responsibility of maintaining supply to thousands of consumers.

I do not agree with " Further Observer " that another organization is necessary in opposition to the E.P.E.A. Most members of that Association are responsible and rational people who would not endorse unofficial strikes or condone the methods used by the E.T.U.

If E.P.E.A. members would only back up their general meetings, and bring pressure to bear on their Executive Council, then the long overdue action might be forthcoming to restore the power engineer to his rightful place and status.

" OBSERVER."

AS an ordinary member of the E.P.E.A. I would inform your correspondent " Frustrated and Disillusioned " that our Association is not dead and does not lie down as he alleges.

An Association is as active as its members make it and anyone eligible for membership, who confesses to be too selfish to join, has himself to blame if that Association appears to do little for him. Higher salaries are won not only in the correspondence columns of the British Press but at the meetings of the appropriate negotiating body. In this sphere the E.P.E.A. is far from backward and not only fights its own battles but paves the way for other branches of the electricity service.

I consider that the trouble is not with associations but with people and that " Frustrated and Disillusioned " has the remedy in his own hands.

" ENERGETIC AND HOPEFUL."

THE correspondence in your columns on relative salaries in the electricity supply industry covers ground very familiar to the Electrical Power Engineers' Association.

I am a little surprised that Mr. J. P. Warren, general secretary of the National and Local Government Officers' Association, should step in with all the weight of his authority to rebuke anonymous " Observer " for not comparing like with like. Mr. Warren is, no doubt, perfectly accurate on the narrow facts he gives, but his letter fails, deliberately or otherwise, to see the true point at issue. It is that in the electrical power industry real savings are made mainly through engineering and scientific development. Hence the balance of advantage in the matter of rewards should go to the engineers and technologists whose work gives the maximum return to the industry. Recognition of the primary importance of the engineer to an engineering industry has been, is, and will remain the aim of the Electrical Power Engineers' Association speaking for the technical staff. Our salaries and status claim achieved a considerable measure of success, but not all we would wish to obtain. There is still much to be done.

Your critical correspondents should give up the bad habit of watching from the sidelines and join with the Association in the continuing battle it fights for the men on whom our national standard of life so largely depends—the engineering technologists. Our recent recruiting campaign has brought a further acquisition of strength to the Association, but there is always room for those few outside. The E.P.E.A. is the only professional organization looking after the interests of the engineer exclusively from top manager to student apprentice.

London, S.W.1. A. M. F. PALMER,
Electrical Power Engineers' Association.

Oil or Gas ?

THE last words of your note on " Energy from the Wind " (1st April, p. 508) of diesel generators helping wind power generators, prompts a suggestion.

Years ago a friend who ran a rural town's electric supply by suction gas engines took the hot water from the cylinders and exhaust pipe jackets into large lagged water tanks. Near them he built bath cubicles, charging a small sum for a hot bath. Result, both satisfied: i.e., he made some money and local folk were pleased, both by waste heat. *Verb sap.*

Why use costly imported oil in diesels when suction gas engines work well on home produced fuel?

Whitchurch, near Cardiff. C. T. ALLAN, M.I.E.E.

Modern Meter Testing

IN his reply of 3rd June to my criticism of his article in the *Electrical Review* of 22nd April Mr. Petch declares that I do not appear fully to have appreciated the significance of the stroboscopic/counter method of testing, but I would say that my appreciation of this method of testing is that it is claimed to increase efficiency and output. The method may increase output, but until we have a comparison of the performance of similar meters tested by the present methods and the stroboscopic/counter method, after the meters have been on circuit for the statutory period, I hesitate to be too enthusiastic about the method. I am of the opinion that too much stress on output is not always an aid to efficiency.

Mr. Petch also declares that the Meters Act is out of date in requiring an electrical dial test. The Meters Act was framed to protect consumers by setting out specific

requirements for meters, and I do not agree that it is out of date in its requirement for an on-load register test; after all, it is the register which declares the value of the quantity being measured, and there are a number of ways in which it can affect the accuracy of the meter reading.

Mr. Petch says he does not recall suggesting a reduction of the low load test to less than one disc revolution. Perhaps he would like to clarify the relevant sentence in his article, which reads:—

"It was found that a tester could, without difficulty, control six such counters at low loads, thus effectively reducing the low load test time to one-third of a revolution or less."

Monkseaton, Northumberland. C. H. FORSTER.

Wind-Power Generation

100 kW Plant Erected at Costa Head

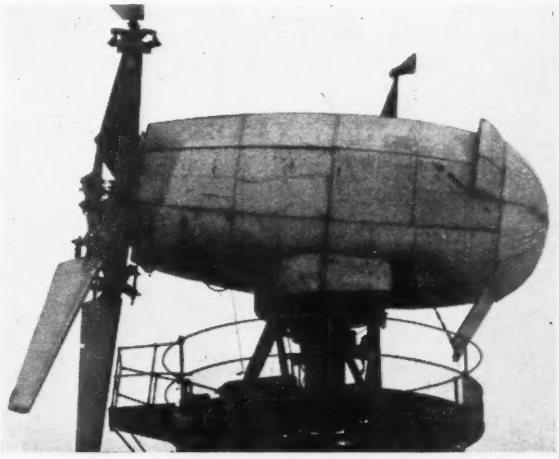
IN 1949 a contract was placed with John Brown & Co. for the erection of a wind-powered electric generator on the 400ft high Costa Head on the Orkney mainland. This windmill—the most powerful in successful operation anywhere in the world—was designed for the North of Scotland Hydro-Electric Board to feed into the local electricity network which is normally supplied by diesel-driven generators. The site at Costa Head was chosen as being one of the windiest places in the British Isles; gusts sometimes exceed 125 m.p.h.

The Board's contract was for a windmill which would generate 100 kW when the wind speed was 30 m.p.h. or above, and a correspondingly reduced output when the wind speed was below 30 m.p.h. This meant that the blades had to sweep a diameter of 60ft. Later, this "rated wind velocity" was increased to 35 m.p.h., thus allowing the swept diameter to be reduced to 50ft.

The windmill consists of a steel tower of such height that the centre of the rotor is 78ft above the ground. On the top of the tower is mounted a nacelle which carries the rotor with its three blades and a step-up gearbox which increases the speed from the hub (130 r.p.m.) to 750 r.p.m. The nacelle is mounted on a pintle shaft to allow the windmill to be yawed round to suit the direction of the wind—this is achieved by a pinion working on a bull ring gear and a small electric motor with speed-reducing gearbox.

The main switch and control gear is housed in a stone building at the foot of the tower. The main electric power and other circuits are conveyed through cables running up one corner of the tower through sliprings which allow the nacelle freedom to yaw. The machine is fully automatic and starts and stops itself untended as and when required by the prevailing wind conditions.

The windmill has three 17ft long blades attached to a three-armed hub so that the swept diameter is 50ft. The blades are of compressed laminated wood with high tensile steel fittings. They are protected against the weather by a plastic coating. Each blade is attached at its root to the end of the hub arm by hinged joints which allow it to lean forward or "cone" with the wind forces and to lean in the direction of rotation or "drag" due to the turning efforts set up in driving the generator. The hinges remove the excessive bending stresses which would otherwise be set up at the roots of the blades when the windmill is running. The thrust of the wind on the blades is opposed by the centrifugal forces which tend to make them fly out. When the windmill is at rest the blades are prevented from flapping loosely on their hinges by locks which are released as the windmill runs up to speed. To prevent excessive vibration when running, the movement of the blades on their hinges is controlled by telescopic hydraulic dampers. The assembly of hub and blades faces downwind to reduce to the minimum the distance between the centre of the tower and the blade rotor and, at the same time, to avoid any possibility of the blades hitting the tower as they revolve.



Close-up of the 100 kW wind-driven generator constructed at Costa Head by John Brown & Co.

There is a small "pilot" windmill on the top of the nacelle which turns at a speed proportional to the wind velocity and tells the main control gear when to start or stop the windmill. To prevent a start from a gust in an otherwise calm period, the control gear averages the wind speed over a number of minutes. Once the signal to start has been given, everything follows automatically in correct sequence controlled by the electrical relays in the control house. The generator is run up to speed as a motor.

FOOD MIXERS

Continuing our series of illustrated surveys of domestic electrical appliances, next week (1st July) we shall be dealing with electric food and drink mixers. Included in the particulars to be given in tabular form will be details of the type, capacity, equipment and accessories, special features, finish and price. In view of the continued demand for these surveys for reference purposes, orders for additional copies of the *Electrical Review* should be placed without delay. The subject of the following survey (22nd July) will be hair dryers

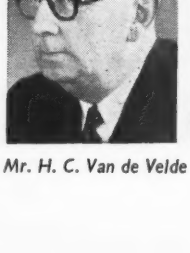
PERSONAL AND SOCIAL

News of Men and Women of the Industry

A number of appointments have been made to boards of three of the subsidiary companies of Kelvin & Hughes, Ltd. The new directors, who will continue their day-to-day duties within the organization, are as follows:—**Mr. F. W. Bates,** who was recently appointed to the board of Kelvin & Hughes, Ltd., the parent company, **Mr. R. W. Dunn,** chief engineer (aviation instrument), **Mr. D. H. Perkins,** works manager, Kelvin Hughes works, Basingstoke, and **Mr. G. Wikkenhauser,** chief development engineer at the company's Barkingside factory, have been appointed to the board of Kelvin & Hughes (Aviation), Ltd. **Mr. P. J. A. Turner,** chief engineer at the Glasgow factory of Kelvin & Hughes (Industrial), Ltd., has been appointed to the board of the company, and **Mr. H. R. Whitfield,** chief radar engineer, and **Mr. R. M. Stephenson,** overseas sales manager to Kelvin & Hughes (Marine), Ltd., become directors of the company.

Mr. H. C. Van de Velde, who has held senior executive posts with Marconi's Wireless Telegraph Co., Ltd., and the Marconi International Marine Communication Co., Ltd., for thirty-six years, is to relinquish his present position as deputy to the managing director of the Marconi Marine Co. on 30th June. **Mr. R. Ferguson,** the general manager, will in future extend the scope of his responsibility for the company's affairs as senior executive. Mr. Van de Velde's services will still be available in a consultative capacity, with particular regard to the company's business abroad, and he will continue to represent the company on the boards of directors of various associated companies overseas, while he will also maintain his association with the Comité International Radio Maritime and the Radio Marine Associated Companies, of which international bodies he is at present president and chairman respectively.

After service in the R.F.C. in the 1914-18 war Mr. Van de Velde joined Marconi's Wireless Telegraph Co., Ltd., as an aircraft wireless engineer, and held a number of appointments, becoming general manager in 1935. He succeeded Mr. F. S. Hayburn as managing director of the Marconi International Marine Communication Co., Ltd., in 1936 while still retaining his position as general manager of Marconi's Wireless Telegraph Co. The following year he went to South America on behalf of the companies, and later went to South Africa where he joined the board of Marconi (South Africa), Ltd., becoming managing director. In 1944 he returned to the United Kingdom as senior executive of the Marconi Marine Co. He is also a director of the Société Anonyme Internationale de Télégraphie sans Fil of Belgium, the Norsk Marconi-kompani, and the Societa Italiana Radio Marittima.



Mr. H. C. Van de Velde *Mr. R. Ferguson*

Mr. Ferguson also saw service in the R.F.C. as a wireless officer, but he commenced his career with the Marconi Marine Co. in 1910 as a wireless officer. In 1919 he joined the newly-formed Radio Communication Co., Ltd., and later became its general manager. In January, 1928, he was appointed manager of the British Wireless Marine Service.

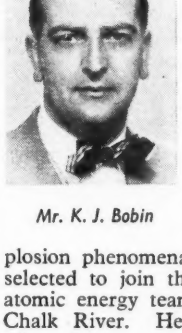
He became joint general manager of the Marconi International Marine Communication Co., Ltd., and its subsidiaries in 1929, and in 1934 became general manager of Egyptian State Broadcasting, which Marconi's Wireless Telegraph Co., Ltd., was at that time conducting on behalf of the Egyptian Government. For his services in Egypt he was made an O.B.E. and awarded the Order of the Nile. After his return from Egypt Mr. Ferguson was reappointed to the Marconi International Marine Communication Co., Ltd., and became general manager in January, 1947.

Dr. C. Dannatt, O.B.E., M.C., managing director of the Metropolitan-Vickers Electrical Co., Ltd., and **Mr. O. W. Thesiger,** deputy managing director of Associated Insulation Products, Ltd., have been appointed directors of the Micanite & Insulators Co., Ltd.

To mark his completion of fifty years' service with David Brown & Sons (Huddersfield), Ltd., **Mr. A. Sykes,** B.Sc., Wh.Ex., M.I.Mech.E., M.I.P.E., M.S.A.E., technical director of the company, was presented by his fellow directors with an engraved silver rose bowl at a luncheon in his honour on 8th June. The presentation was made by Mr. A. Avison, a director of the David Brown Corporation, Ltd., and general manager of the David Brown Gear Group. Mrs. Sykes, who also attended the luncheon, was presented with a leather handbag by Mr. J. Whitehead, a director of the David Brown Corporation, Ltd., and general manager of the Tractor Group.

Mr. A. Sykes (right) receives a silver rose bowl from Mr. A. Avison to commemorate his fifty years' service with David Brown & Sons (Huddersfield), Ltd.

Mr. K. J. Bobin, B.Sc., who writes in this issue on "The Industrial Application of Nuclear Power," entered Government service in 1940 when he joined the Road Research Laboratory of the Department of Scientific and Industrial Research, where he was engaged on the measurement of underwater explosion phenomena. In 1944 he was selected to join the British-Canadian atomic energy team in Montreal and Chalk River. He went to Harwell when it was started in 1946, and worked on the first British reactor, GLEEP, until 1951. In that year he went to the British Embassy in Washington as scientific liaison officer, and returned to Harwell in April, 1954, to become manager of the newly-formed Harwell Reactor School.



Mr. K. J. Bobin

Thorn Electrical Industries, Ltd., announces further changes in the sales organization of its Atlas Lighting Division. **Mr. E. W. King,** former area sales manager, Midlands area, is being transferred to head office to work directly under the general sales manager on a special assignment in connection with large industrial users. Other changes include the division of the London area into two parts with **Mr. R. S. Gowing** as area sales

manager, London area north, and **Mr. M. J. Donaghy** as area sales manager, London area south. **Mr. L. A. Moir** will assume responsibility for dealing with large wholesalers with head offices in the London area.

Mr. E. Cattanes, B.Sc., M.Brit.I.R.E., Sen.M.I.R.E.(U.S.), has joined the Solartron Electronic Group, Ltd., Thames Ditton, Surrey, as a senior commercial executive. He will be responsible for developing the European export market for Solartron electronic instruments and will open up the new Paris office later in the year. Mr. Cattanes was born in France and was educated at the Polytechnic, Regent Street, and the Universities of London, Grenoble and Turin. In 1934 he started and managed in Paris the French subsidiary of A. C. Cossor, Ltd., and returning to this country in 1937, he managed the newly formed Cossor Instruments Division in London. He joined the Radiotel Corporation (British Philco) in 1946 as manager, starting the Electronics Products Division, which later became Airmec, Ltd. He was appointed manager of the Industrial Electronics Division of the English Electric Co., Ltd., at Stafford, in 1948, and in 1950 spent several months in the United States. In 1952 he went to Canada to join the Industrial Electronic Co. of Canada, Ltd., Toronto, and at the end of 1954 he returned to England.

The South of Scotland Electricity Board announces the appointment of **Mr. R. J. Wills,** A.M.I.E.E., as commercial officer of the Dumfries and Galloway Area as from 1st July. After service with Crompton Parkinson, Ltd., Fulham Borough Council Electricity Department and the Southern Electricity Board, Mr. Wills was in 1953 appointed district commercial engineer of the Annan District of the former South West Scotland Electricity Board.

In the list of electrical men who have been included in the Birthday Honours, published in our last issue, we mentioned that **Mr. J. M. Boyd,** B.Sc. (Eng.), A.M.I.E.E., of the Electric Construction Co., Ltd., had been awarded the M.B.E. We now reproduce his portrait. Mr. Boyd joined the Electric Construction Co. in 1927. He became chief switchgear designer in 1949 and chief engineer of the Switchgear Department in 1954.

Mr. J. M. Boyd

Mr. E. P. Swan, deputy chief engineer and manager in the Ceylon Government Department of Electrical Undertakings, is due to arrive tomorrow for a course arranged under the Technical Co-operation Scheme of the Colombo Plan. He will spend a month with the North of Scotland Hydro-Electric Board and will then go on to the Central Electricity Authority's Educational and Training Branch in London.

Mr. P. G. Lloyd, A.M.I.E.E., steam testing engineer of the North Eastern Division, C.E.A., has retired after forty-eight years' service in the electrical industry. He started work at Hoylake and West Kirby electricity works in 1907 where he was charge engineer for two years, following three years as a pupil. For a short period he was with Chamberlain & Hookham, Ltd., Birmingham, and in 1912 he joined the Newcastle-upon-Tyne Electric Supply Co., Ltd. (subsequently the North Eastern Electric Supply Co., Ltd.) as technical assistant in the Test Department, with whom, apart from three years in the Royal Engineers during the 1914-18 war, he remained until vesting day when he became the steam testing engineer of the North Eastern Division. Mr. Lloyd is a member of the North East Coast Institution of Engineers and Shipbuilders. Many of his friends and colleagues were present when Mr. J. C. Mitchell, divisional controller, recently presented him with a silver salver and a barograph to mark the occasion of his retirement.

Mr. P. G. Lloyd

Mr. C. G. F. Pritchett has been appointed chief engineer of the Exide Works, Manchester, of Chloride Batteries, Ltd., in succession to the late Mr. C. P. Lockton.

Mr. C. Barwell has been elected president of the Incorporated Advertising Managers' Association. Mr. Barwell is general publicity manager of Mullard, Ltd.

Mr. M. Clark, director of the Electronics and Equipment Group of the Plessey Co., Ltd., left this country on 13th June for a visit to the United States to observe new developments there in the field of electronics and telecommunications.

Mr. P. Evans has been appointed home sales manager of the Brush Electrical Engineering Co., Ltd., Loughborough. He is responsible for the organization and operation of the company's branch offices in Great Britain. Mr. Evans remains sales director of the Hopkinson Electric Co., Ltd., Cardiff, a position he has held since November, 1954.

Mr. S. R. Kelly has been awarded the 1955 Birmingham Electric Club Scholarship. Mr. Kelly is a laboratory technician at Erdington Technical College and is working for the B.Sc. degree at the Birmingham College of Technology.

Mr. R. A. Jay, district engineer, Wallsend District of the North Eastern Electricity Board, is leaving to take up an appointment on the Gold Coast.

Mr. W. F. H. Michaelis has joined the boards of the Aircraft & General Engineering Co., Ltd., and its associated company, Oprim Sales, Ltd., as sales director. Mr. Michaelis has returned to the commercial world after service with the Royal Engineers as a technical officer and later as a civilian official.

The **Eastern Electricity Board,** Northmet Sub-Area, held their annual sports meeting at "Woodcroft," Winchmore Hill, on 11th June. There were twenty-seven field events which produced keen competition. The children had their own sports meeting, as well as Punch and Judy and other sideshows, together with a steam railway. The Hertford Club repeated their success of the previous year by gaining the shield awarded for the largest number of points. Standard Telephones Athletic Club assisted by providing track gear and officials to act as starters.

Mr. D. H. Leeson, M.A.(Cantab.), A.M.I.E.E., G.I.Mech.E., has joined Crompton Parkinson, Ltd., as home sales manager of the company's associate switchgear concern, Cooke & Ferguson, Ltd. Mr. Leeson was educated at Uppingham and King's College, Cambridge, and has hitherto been with A. Reyrolle & Co., Ltd. Having received his student training with that company, he subsequently held increasingly senior positions in the contract department, serving for a number of years with the outside contracts staff in Leeds and, more recently, as deputy to the area manager in Nottingham. In his new position Mr. Leeson will operate from Manchester.

Mr. D. H. Leeson

This year's **South West Area Golf Meeting** will be held at Yelverton Golf Club, South Devon, on 5th July. Any golfer in the electrical industry south of Gloucester and in the counties of Somerset, Devon and Cornwall who wishes to compete and has not yet submitted a qualifying score card should do so as soon as possible. Tickets can be obtained from the secretary, Mr. A. Hughes, B.I.C.C., Ltd., 7-9, Barton Street, Bristol, 1. A dinner will be held at the Golf Club after the presentation of prizes.

Mr. A. E. Nicol, director of the Hackbridge & Hewittic Electric Co., conversing with Mr. E. A. Logan, chairman of the I.E.E. Southern Centre, on arrival at the works

The summer meeting of the Southern Centre of the **Institution of Electrical Engineers** took place on 17th June, 72 members and guests meeting at Hampton Court where they were entertained to lunch and later conducted round the works of the Hackbridge & Hewittic Electric Co. at Walton-on-Thames, returning to Hampton Court for tea. Visitors saw a large number of transformers in capacities up to 120 MVA in various stages of manufacture and had a glimpse of the enlarged impulse generator section now in course of erection in the factory extension. In the rectifier section of the works special demonstrations were given of the fabrication of glass bulbs and following a tour of the assembly shops the visitors saw a 550 kW, 1,500 V mining traction unit in operation.

Mr. E. R. Sisson, A.R.Ae.S., has been appointed technical services manager to Smiths Aircraft Instruments, Ltd., in succession to Mr. Langmead, who died recently.

The Private Telephone Department of **Siemens Bros. & Co., Ltd.,** held an informal cocktail party for a number of their friends at the Piccadilly Hotel, London, recently, when about 170 attended. The guests were received by the department manager, Mr. L. E. Jones, and his wife, and the Siemens Telephone Section manager, Mr. B. A. Hensler, and his wife and daughter were present.

More than 200 members of **Dimplex, Ltd.,** with their families attended the company's Sports and Social Club's annual outing on 18th June, which included a visit to Windsor, a trip on the Thames, and the final performance of the Royal Tournament at Earls Court, London. All the directors, Messrs. E. J. Wade (managing director), A. Roch, J. A. Graham and H. R. Heath, took part.

Sir Roger Duncalfe, president of the British Standards Institution, was elected president of the International Organization for Standardization at the triennial general assembly held in Stockholm.

OBITUARY

Lt.-Col. J. G. Wilson.—The death occurred on 16th June of Lt.-Col. Joseph Geary Wilson, M.I.E.E., of Brora, Sutherland.

WILLS

Mr. I. T. L. Whipp, director of Whipp and Bourne, Ltd., who died on 8th February last, left £41,143 gross (£24,347 net).

Mr. J. J. Hammond, former director of Oldham and Son, Ltd., who died on 28th October last, left £9,697 gross (£9,600 net).

PARLIAMENTARY REPORT

Ministries and Industry

It was announced by the Prime Minister in the House of Commons last week that the Minister of Supply's responsibilities for the iron and steel, non-ferrous metal and engineering industries are shortly to be transferred to the President of the Board of Trade. The position of the electronics industry in relation to Government Departments is being examined by the Government.

Monopolies and Restrictions

The President of the Board of Trade, Mr. Peter Thorneycroft, replying to nine questions relating to monopolies made a statement about the Monopolies Commission. Mr. Norman Dodds had asked if the President of the Board of Trade was aware that eight British electrical firms had submitted identical tenders for equipment for the Snowy Mountains hydro-electric and irrigation scheme; and what steps he intended to take to prevent this practice, in view of the harm which it did to our export reputation and trade.

Mr. Thorneycroft said that at present the Commission had nine inquiries on hand and reports on at least three of these would be received before the end of this year. He now proposed to send to the Commission a further general reference under Section 15 of the Monopolies and Restrictive Practices Act covering common prices and level tendering, both of which had been much in the public mind in recent months. He intended in addition to make a number of individual references. The making of a reference in no way prejudged the question whether or not the arrangements involved operated against the public interest. It was indeed one of the main functions of the Commission to inquire into this point. The references which he expected to make very shortly would be on the supply of steel frames for buildings, electric street lighting, tea, chemical fertilizers and electric batteries.

Rating of Power Stations

In the debate on the second reading of the Rating and Valuation Bill Mr. Nabarro said that the Bill took a modest step in the right direction where it dealt with the rating of Gas Boards but it omitted reference to the major problem—the electricity industry, which to-day had the most valuable fixed assets. The Boards made payments in lieu of rates to the Minister of Housing and Local Government who applied them for the benefit of local authorities generally (the Secretary of State for Scotland did the same in Scotland) and the amounts varied according to changes in the average rates levied by local authorities and in the amount of electricity supplied to consumers.

He thought the system should be changed by an amendment to the Bill when it got to the committee stage. Local authorities with large power stations in their areas were being very harshly treated and severely mulcted of revenue.

Shopkeepers had another great grievance. Electricity Board premises were not only concerned with the collection of electricity accounts; they sold television and radio sets, electric cookers, and all manner of electrical appliances. He was not complaining about that but these shops should be given the same rating treatment as private enterprise shops.

Mr. Nabarro pointed out that the power stations owned by many large industrial concerns were free of rates. Although they were 75 per cent de-rated they were still at a disadvantage compared with the publicly-owned power stations. He suggested that the Inland Revenue Department should value the power stations, and that the Area Boards should pay their rates directly to the local authorities.

Replying to the debate, Mr. W. F. Deedes, Parliamentary Secretary, Ministry of Housing and Local Government, said that Mr. Nabarro's point was met by the assurance that

he gave when the Bill was last before the House that the pool payments would be the subject of a review in the year in which the revaluation took place. Local authorities would take part in the discussions.

Coal Situation

Coal production continued to give the Government great anxiety, Mr. Geoffrey Lloyd, Minister of Fuel and Power, told the House of Commons during the debate on the Queen's Speech. He said that full employment imposed two serious disabilities on the coal mining industry: it could not get enough men and the demands made on it by a bounding economy had exceeded the available supplies of coal by millions of tons each year. Even making allowances for this, however, the performance of the industry during the winter and in recent months had not been good. There had been a growing deficit that had had to be met by imports and these were now running at a rate of a millon tons a month. This would result in a worsening of our balance of payments in 1955 of about £80 million. What made it worse was that a large part of it must be in dollars for American coal.

Mr. Stephen Swingler said there were still not enough workers or an adequate rate of investment in the coal mines. The original programme of the National Coal Board for capital investment had not been achieved, year after year, in the last five years. Mr. Lloyd said he agreed, but pointed out that considerable progress had been made in the last three years; the rate of investment was now three times greater than it was four years ago and would increase still further. Now, for the first year, the Board had reached the proper rate of investment.

Southend Line Electrification

Mr. John Boyd-Carpenter told Mr. Parker that the British Transport Commission informed him that progress was being made with the planning and surveying necessary for the major engineering works which must be carried out before the actual electrification of the Fenchurch Street, Tilbury and Southend line could begin. It was hoped to make a start with the new "flyover" junctions at Barking and the re-arrangement of the track layout in the spring of next year.

Credit for British Scientists

Mr. Ellis Smith asked the Prime Minister if he would have published for the Atoms for Peace Exhibition to be held in Geneva the full story up-to-date of our contribution and the part played by Lord Rutherford, C. R. Burch, T. E. Allibone, T. S. Walton, Sir John Cockcroft, J. D. Craggs, N. Elce, H. Smethhurst and M. E. Haine; and if he would arrange that the language be as simplified as possible and printed in all languages where there would be a demand for the publication. He also asked for the publication of a full report on the English contribution made under Government auspices towards splitting the atom, on the Trafford Park designed and built prototype machines for the atomic bomb project, the dates upon which Dr. Allibone left Manchester for the purpose of taking charge of the British and United States scientists at the University of California, on who introduced the electro-magnetic method of separating uranium isotopes, and on other information that would give the credit where it was due so that it would be on record for the future.

Sir Anthony Eden replied: "A book entitled 'The Commonwealth and Nuclear Development,' designed for those of us who are not specialists, has been prepared by the Central Office of Information. I hope that it will be available in time for the Geneva Conference on the Peaceful Uses of Atomic Energy. The book will be on sale in this country through the Stationery Office, and is being distributed abroad free of charge by the United Kingdom Information Offices in English, French and Spanish. This book gives an up-to-date account of the British contribution to nuclear research.

"Some details of the United Kingdom contribution during 1939 to 1945 were given in official statements released in 1945. British developments in atomic energy have been reported in a number of publications since then. In addition a considerable amount of information of a more technical nature has already been published. I do not think that any further official publication is required at this time."

Atomic Power Agreement

A new agreement between Great Britain and the United States providing for reciprocal co-operation between the two countries in the development of power generation by atomic means, including the exchange of information, material, equipment and personnel, was presented in the House of Commons on Monday by Sir Anthony Eden, the Prime Minister. After describing the terms of an agreement on co-operation in the military aspects of atomic energy, he said that the civil agreement provided also on a fully reciprocal basis for the exchange between the United Kingdom Atomic Energy Authority and the United States Atomic Energy Commission of information on a wide variety of subjects including the generation of power by atomic means. It also provided for the transfer of materials and equipment between the authorities and permitted the exchange of information, the sale of equipment, and the use of patent rights between the electricity authorities and industrial firms which were working in their respective countries on the development of atomic power. These exchanges would take place on a commercial basis and subject to certain safeguards. By permitting the interchange of scientific and technical knowledge between the two Western countries which were most advanced in these matters, the agreement would help to quicken the pace of atomic development.

When the House of Lords debated the Government's programme for the next year of Parliament many peers asked why the development of nuclear power stations could not be speeded up so that a "bottleneck" in the supply of electricity could be avoided. Replying for the Government, the Marquess of Salisbury, Lord President of the Council, said that the reasons for the atomic piles not being completed earlier were not primarily concerned with finance; each pile was an experiment from which the scientists learnt something which could be used in the next. Therefore it would not be wise to complete them all at once. Another reason was simply that the workmen for these developments were not available; it was a completely new sphere and the Government was having gradually to train up the people who could do what was necessary. Because of these factors the Government had to proceed at a fairly sedate pace.

Lord Teynham said it was deplorable that the average amount of coal produced in the last three years was barely 225 million tons a year and production remained static while, on the other hand, industrial production rose by 6½ per cent in 1954. It was obvious that we were approaching a bottleneck in power supply. It was no use putting up more coal-fired power stations if the coal was not available. In 1954 the demand for electricity increased by 11 per cent but the additional electric power was only about 8 per cent. If drastic steps were not taken to increase the power supply the living standards of the country would be jeopardized.

[In our report last week of the speech made by Mr. Geoffrey Lloyd, Minister of Fuel and Power, the passage about the designing of the nuclear power stations should have read: "The actual work of designing the new stations . . . would be completed by the second quarter of 1956, and the actual start of physical building would take place in the first part of 1957."]

Australian Tariff Inquiry

The Australian Tariff Board has been asked to inquire into and report on the rates of duty on chokes and ballasts for fluorescent lighting (Tariff Item 179 (B) (7)). Notification of intention of United Kingdom interests to give evidence has to be given to the Australian authorities by 2nd July. Therefore United Kingdom trade associations or firms concerned should inform the Board of Trade, Commercial Relations and Export Department, Horse Guards Avenue, London, S.W.1, before that date, quoting reference No. C.R.E. 6592/55.

INDUSTRIAL NEWS

A.E.I. Secure Indian Railway Order

Electric traction equipment worth about £900,000 has been ordered from Associated Electrical Industries (India), Ltd., by Jessop & Co., Ltd., who are supplying 104 railway coaches for broad-gauge multiple-unit trains for the Calcutta electrification of the Indian Government Railway Board.

The new rolling stock will consist of 34 three-coach units (two driving trailers with a motor coach between); two spare motor coaches have also been ordered. The bulk of the electrical equipment will be made by the Metropolitan-Vickers Electrical Co., Ltd., at Sheffield and Trafford Park, and about 10 per cent will be manufactured in India by the A.E.I. Manufacturing Co., Ltd.

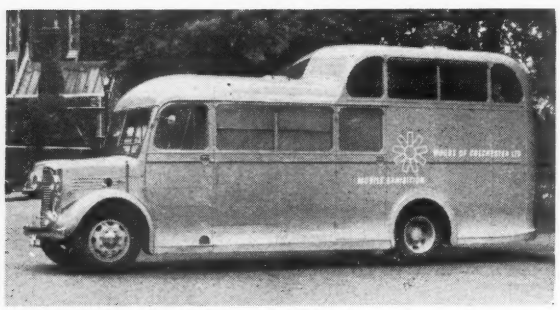
P.O. Workers' Position

Welcoming the Government's decision to allow the expenditure of £80 million on capital development by the Post Office during the current financial year, most of it upon the telephone service, Mr. L. G. Fox, president of the Post Office Engineering Union, said that the decision would bring with it a demand for better conditions for the Union's members. He was speaking at the Union's annual conference last week and he said that the years of impoverishment and improvisation had resulted in cramped and badly lighted, heated and ventilated buildings, out-dated equipment and decayed poles. All this was detrimental to full efficiency and subscribers and would-be subscribers had suffered. Mr. Fox spoke of steps which were necessary to improve the status and pay of Post Office engineering workers.

Mobile Fan Exhibition

To increase their export trade, Woods of Colchester, Ltd., have sent their mobile exhibition of fans on a fifteen weeks' tour of six European countries. After three weeks in Holland it has visited Brussels, Lille, Liège and the Dunkirk shipyards. It is now touring the chief industrial towns in northern and central France. A week will be spent in Luxembourg; from there the exhibition will go to Switzerland and then back into France, visiting Lyons and the shipyards at Marseilles. It will then tour northern Italy for two weeks.

The Woods of Colchester, Ltd., mobile exhibition now touring European countries



Back to Normal

This copy of "Electrical Review" should have reached you in the normal way at the normal time. During the past three weeks of improvisation some readers may have received their copies late, but we hope that they will not blame either publisher or newsagent

G.E.C. Television and Radio Production

To meet the increased demand for its domestic television and radio products, the General Electric Co., Ltd., is transferring the production of domestic radio receivers from its Spon Street Works to another factory in Coventry, and is devoting to television production the whole of the manufacturing space previously occupied by domestic radio production. The new and enlarged facilities for television production include flow line assembly tracks which embody "soak" testing facilities during the various manufacturing stages. These changes will increase potential output by more than 50 per cent.

Primer of Productivity

The term "management" covers all those whose actions and attitudes have a direct bearing on the carrying out of a firm's policy and must be widened to include not only supervisors but in addition shop stewards and trade union officials who urgently need an understanding and appreciation of management techniques. The difficult problem of how to transmit this knowledge to them is being met by the British Productivity Council by setting out such techniques in plain straightforward language in a book entitled "Better Ways." The plan followed is to describe some of the main techniques or methods in short chapters and then to illustrate each by one or more case studies showing how they have been used in leading firms. Close attention is given throughout to the fact that such methods will produce little result if good relations have not been established first and some articles are devoted to the human problem.

The publication is obtainable from the British Productivity Council, 21, Tothill Street, London, S.W.1, at 2s 6d (including postage).

South Western Board's Kettle

The South Western Electricity Board has designed a kettle in which, it says, it has sought to include all the best features of the electric kettle. It has automatic control and interchangeable elements to give loadings of 1,000, 1,500 or 2,000 W. The kettle is being made for the Board by "a well-known manufacturer" whose name is not disclosed and the Board has registered the trade mark "Tor" in respect of the appliance.

Prices of Materials

In the accompanying table we give the basis prices of the more important materials used in the electrical industry. The figures given are the selling prices and are those quoted on Tuesday last.

ALUMINIUM Ingots	ton £163 0s 0d
COPPER, H.C. Electro	ton £351 5s 0d
Fire Refined 99·70%	ton £350 0s 0d
Fire Refined 99·50%	ton £349 0s 0d
COPPER Tubes ..	lb 3s 2½d
Sheet	ton £414 5s 0d
H.C. wire and strip ..	ton £389 15s 0d
LEAD, English ..	ton £102 15s 0d
Foreign	ton £101 0s 0d
MERCURY	flask £108 0s 0d
TIN, block (English) ..	ton £724 15s 0d
ZINC, G.O.B. Foreign	ton £91 5s 0d
Electrolytic	ton —
BRASS Tubes (solid drawn)	lb 2s 6½d
Sheet	ton £327 0s 0d
Wire	lb 3s 3½d
PHOSPHOR BRONZE Wire	lb 4s 10½d
PLATINUM	oz £29 0s 0d
RUBBER, No. 1 R.S.S. spot	lb 35½d—3[illegible]d

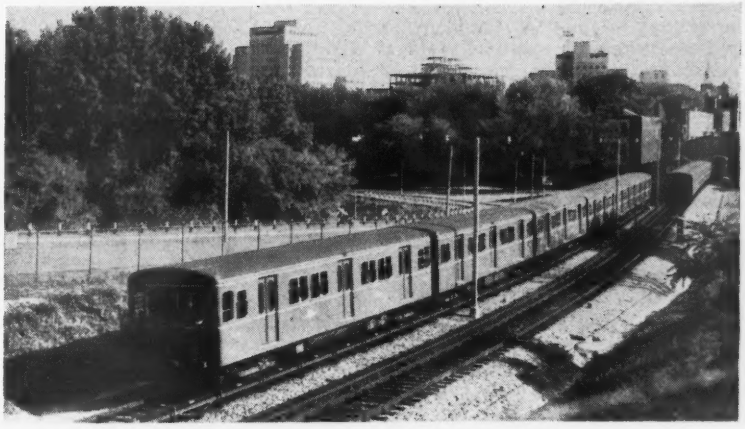
Toronto Subway Order

Such has been the success of the Toronto Rapid Transit Subway, that the 104 British-built cars with which the Subway was inaugurated in March, 1954, are now insufficient to carry the increased passenger load. In consequence the Toronto Transit Commission has placed an order for thirty-four additional cars, with the

Gloucester Railway Carriage & Wagon Co., Ltd., despite severe competition from Continental and Canadian manufacturers. The 136 traction motors, and all batteries and the auxiliary supply equipment for these cars will again be manufactured by Crompton Parkinson, Ltd.

Crompton Parkinson have also on previous occasions supplied electrical equipment to the Toronto Transit Commission for its P.C.C. type street cars and since 1950 they have supplied 460 traction motors and fifty-five sets of auxiliary supply equipment to the Commission.

The all-steel coaches just ordered will be equipped as before with B.T.H. electro-pneumatic camshaft control equipment. This form of B.T.H. control equipment is fitted on the majority of motor coaches now operating on the surface and tube lines of London Transport.

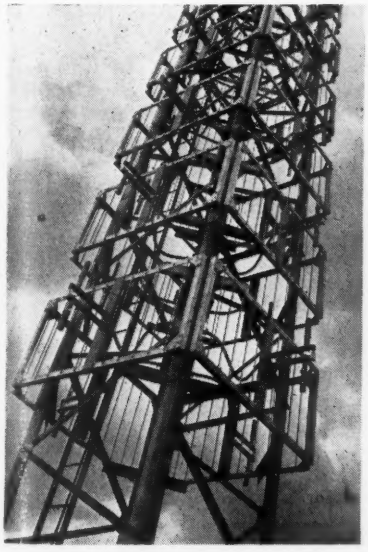


Two Toronto Rapid Transit cars in service

Vacuum Cleaner Salesmen's Position

Following the recent decision at Bradford City Court that vacuum cleaner salesmen, canvassing from door to door, required a licence under the 1871 Pedlars Act (*Electrical Review*, 10th June), notice to state a case has been served upon the Clerk to the Bradford Magistrates (Mr. Frank Owens) and the Chief Constable of Bradford (Mr. H. S. Price). No case has previously been stated on this point and the matter will be decided by the High Court.

At the hearing Mr. B. A. Hyther, defending, submitted that it was never intended that the Act should apply to the present-day class of salesman, who, like the defendants, went into an area with a motor vehicle and then went from door to door soliciting first a demonstration and then orders for vacuum cleaners. The Act was intended to apply to the wandering pedlar or tinker who, with only a pack on his back, went from door to door trying to sell things and in those days became a nuisance.



Part of the 8-stack Band III vertically polarized aerial array of the Independent Television Authority's Croydon transmitter the whole of the equipment for which is being supplied by Marconi's Wireless Telegraph Co., Ltd.

Norwich Cooking Demonstration

About 1,400 people attended a recent electric cooking demonstration at Norwich organized by the Norfolk Sub-Area of the Eastern Electricity Board. Both the afternoon and evening demonstrations were given by Miss Marguerite Patten, who was introduced by Mr. W. Barrington-Dalby, a member of the Board's staff. The Lady Mayoress of Norwich, the director of education for the County of Norfolk and the principal of the Norwich City College and Arts School, and members of local authorities, were among those who attended.

Organized parties from the local branches of Women's Institutes formed a large part of the audiences, and a private demonstration was also given to over 300 members of the Board's staff. Automatic cooking, showing cookers with control panels, was the theme of a special display in the hall. Other display stands included water heating apparatus, washing machines, wash boilers, refrigerators and food mixing demonstrations.

Works Visit

Three young Malayan electrical engineers, in this country under United Nations' scholarships to study recent developments in the communications field, have just completed a fortnight's visit to the Liverpool works and other installations of the Automatic Telephone & Electric Co., Ltd. The visitors, Mr. Phooi Thong, Mr. Say Hai and Mr. Ah Thow, all of whom are employed by the Malayan Post and Telegraphs Department, were shown some of the latest types of automatic exchange and carrier equipment. They also saw modern production methods in use at the factory.

South African Electrical Trade

The values of the chief groups of electrical imports into the Union of South Africa during the first nine months of last year are shown in the accompanying statement with notes of increases or decreases on the corresponding period of 1953. There was an overall increase of about 11 per cent, accounted for mainly by larger purchases of dynamos and generators. Imports of cable and wire continued to decline.

Class of Goods	Jan.-Sept. 1954 £(000)	Inc. or dec. Jan.-Sept. 1953 £(000)
Batteries and parts ...	469	– 56
Dynamos and generators	3,395	+ 1,022
Motors	1,573	+ 21
Transformers	1,886	+ 395
Cable and wire (rubber insulated)	223	– 115
Cable and wire (other) ...	1,001	– 92
Electric stoves and parts	191	+ 61
Lamp bulbs	337	+ 44
Radio apparatus and accessories	1,368	– 28

Exports of electric cable and wire were valued at £469,000 in Jan.-Sept. last year compared with £938,000 in Jan.-Sept. 1953, batteries "not rechargeable" £82,000 (£87,000), and batteries "rechargeable" £153,000 (£115,000), while exports of machinery and parts, not agricultural, were valued at £4,647,000 against £4,835,000 in the corresponding period of 1953.

E.W.F. List of Members

The 1955-56 List of Members of the Electrical Wholesalers Federation is now available. No charge is made for the first copy but further copies may be obtained at a cost of 1s each from the Association at Kingsway House, London, W.C.2.

Guide for Employees

In order that new employees may know the facilities which are available, Aldis Brothers, Ltd., Birmingham, has

issued a booklet in which it outlines the various schemes in operation for the benefit of employees. Such matters as holidays, suggestion schemes, welfare, first aid, canteen and social activities are dealt with.

Bowater Plant in America

It is announced by the Bowater Paper Corporation, Ltd., that the large paper mills which it started up at Calhoun, Tennessee, last year (see *Electrical Review*, 3rd September, 1954) are being extended at a cost of $25 million. The programme, which it is hoped to complete in the autumn of next year, includes six new grinders (making fourteen) each driven by a 6,000 h.p. synchronous motor.

The drive for a new 276in newsprint machine will be of the multiple-generator, amplidyne controlled sectional type. Power demand by the works will rise by 35 MW to 80 MW; of this 10 MW will be supplied by the Tennessee Valley Authority and the rest by an extension of the existing power house.

New Cossor Company

A. C. Cossor, Ltd., announce the formation of Cossor Instruments, Ltd. The new company will design and develop new instruments to meet the demands of research and industry and is equipped to promote and deal with the application of electronics to industries which heretofore have not used the new science. The chairman is Lord Burghley and other members of the board are Mr. J. S. Clark, Mr. H. Chisholm, Mr. H. T. Shepherd and Mr. L. A. Woodhead (general manager). The address of the new company is Cossor House, Highbury Grove, London, N.5.

Diesel-Electric Locomotives for Eire

It was announced in May, 1954, that Coras Iompair Eireann (Irish State Transport) had awarded to Metropolitan-Vickers a contract worth £4¾ million for the supply of ninety-four diesel-electric locomotives. Of these, sixty were to be of the 1,200 h.p. six-axle type, and thirty-four of the 550 h.p. four-axle type. Work on this contract is now well advanced, and Mr. T. C. Courtney, the chairman of Coras Iompair Eireann, with Mr. F. Lemass (general manager) and Mr. O. V. S. Bulleid (chief mechanical engineer) recently made a two-day visit to Manchester to see the first of the locomotives. On the first day Mr. Courtney and his colleagues inspected the first batch of six-axle units in course of erection at Dukinfield Works (British Transport Commission), part of which has been leased by M-V, and in the afternoon they made a short tour of the Trafford Park works, where the control equipment for the locomotives is manufactured. On the following day they visited the Openshaw works of Crossley Bros., Ltd., who are building the diesel engines. The bodies and mechanical parts are being manufactured for M-V by the Metropolitan-Cammell Carriage & Wagon Co., Ltd., Saltley, near Birmingham.

Marconi Television Centre

The Broadcasting Division of Marconi's Wireless Telegraph Co., Ltd., has established, near the centre of London (St. Mary Abbot's Place, W.8), the first fully equipped television training studio of its kind in Britain. A complete training course in the operation and maintenance of television studio equipment is undertaken by the Marconi College. The Centre is available to any organization wishing to use the equipment for training their own studio and production staffs or for rehearsals or auditions under true operational conditions. Telecine equipment is available for those wishing to appraise filmed programmes on television. A complete mobile outside broadcasting unit is attached to the Centre. Arrangements can be made for live broadcasts to be originated from the Centre, which has a stage of approximately 2,000 sq ft. Among those already making extensive use of the facilities are Associated-Rediffusion, Ltd.

Annual Holidays

Precision Components (Barnet), Ltd., is closing its works for the annual holidays from 21st July to 6th August.

The Hendon and Stockton factories of the Phœnix Telephone & Electric Works, Ltd., Phœnix Tinsel Products, Ltd., and Correx Communications Equipment (1948), Ltd., will be closed for the annual holidays from 12th to 29th August.

The works of Bruce Peebles & Co., Ltd., will be closed for the Edinburgh trades holiday from 1st to 18th July.

The works of William McGeoch & Co., Ltd., will be closed for the annual holidays from 22nd July to 8th August.

Educational

The Portsmouth College of Technology has issued a prospectus of day and evening courses which include electrical and radio engineering, physics and mathematics.

Trade Announcements

With the growth in automobile and electrical equipment manufacture in Britain and overseas, further expansion of the manufacturing capacity of the AC-Delco Division of **General Motors, Ltd.**, is necessary to meet the rising demand for its products, and a new site has been selected for a third plant at Kirkby, Liverpool.

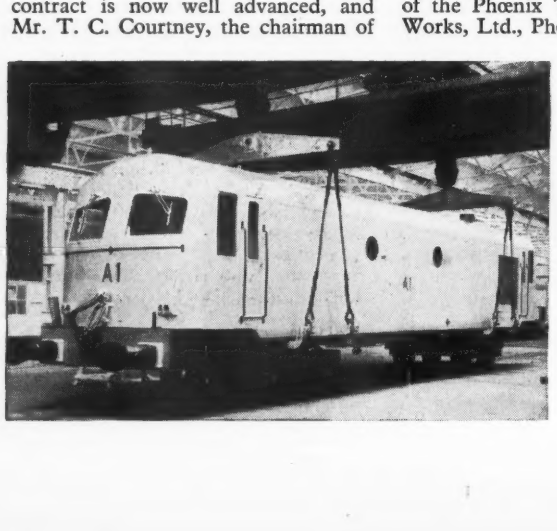
The registered office of **Hivac, Ltd.**, is now at its factory at Stonefield Way, Victoria Road, South Ruislip, Middx. The factory, which has been in operation for a year or more, is being extended and it is the ultimate intention to collect at Ruislip a large part of the company's facilities which are at present distributed over a number of scattered units.

William McGeoch & Co., Ltd., announce the appointment of the following sales representatives:—Mr. R. W. F. Ell (late Lancashire Dynamo Switchgear, Ltd.), to be senior sales representative in the London Area, which includes the counties of London, Middlesex, Surrey, Kent, Sussex, and parts of Hants, Berkshire, Oxfordshire, Buckinghamshire, Hertfordshire, Essex and Wiltshire, and also to be in charge of their London office. Mr. G. E. Moore (late Tuscan Engineering Co., Ltd.) and Mr. C. K. Heffernan (late George Becker, Ltd.), to be assistant sales representatives in the London Area: Mr. Moore, Eastern Section, and Mr. Heffernan, Western Section. Mr. W. O. Scofield (late Crypton Equipment, Ltd.), to be sales representative in the south west area in place of Mr. J. L. Lovell, who has been appointed to look after the company's Government interests in the area.

W. Edwards & Co. (London), Ltd., have changed their name to Edwards High Vacuum, Ltd. A further 40,000 sq ft of factory space has been added to the rear of the company's new Crawley factory.

The sales division of **George Becker, Ltd.**, is now at 130, Uxbridge Road, Hanwell, London, W.7 (telephone: Ealing 4741-2).

H.V.E. (Electric), Ltd., have moved to Viaduct Works, Viaduct Place, Kirkstall Road, Leeds, 4 (telephone: Leeds 29315).



Metropolitan-Vickers diesel-electric locomotives for Eire. A locomotive body in the railway assembly shops at Dukinfield, Manchester

The Automatic Factory

Production Engineers' Conference at Margate

LAST week the Institution of Production Engineers, under the presidency of Sir Walter Puckey, held a short but intensive conference at Margate on "The Automatic Factory—What Does it Mean?" "Automation" has come very much to the fore in recent months and the series of papers and discussions held will have served to clarify the thinking of many people on the implications both technical and social of this important trend in manufacture and clerical routine. Eighteen discussion papers were presented covering the major aspects of the subject in a broad way and in several more specific applications.

Automation, as it seems to be envisaged, covers the improvement of machine to machine transfer arrangements largely by mechanical means, the application of electronic computer control to the setting-up and operation of individual machines and groups of machines, the automatic control of flow processes involving materials of a fluid nature, largely achieved already in such industries as oil and paper, computer control of machine planning, stock control and routine factory clerical needs such as wages, and possibly invoicing. Arising out of developments in these directions are the problems to be faced by the workers themselves and their unions, by management, by education authorities and by the community as a whole.

Effect on Living Standards

On Thursday evening, after an address of welcome by the Mayor of Margate, Sir Walter Puckey delivered the opening address to the conference and took as his theme the achievement via automation of Mr. Butler's recent target of a doubled standard of living in the next twenty-five years. He assessed the causes and effects of the first industrial revolution and described it as the discovery of machine power to the oblivion of man. The second industrial revolution, now well under way, combined man's own power with that of the machine and the stage we were now entering was that in which extensive control power was being added to this combination. Control was the key to automation and it would be exercised more by electronic means than by any other. In assessing the purpose of automation and the tasks it set to industry he stressed the need for a greater recognition of the value of human rights, responsibilities and aspirations, and the importance of the young men of to-morrow being educated to a higher degree of skill than at present.

The following day's discussion meetings were preceded by an address from the Earl of Halsbury, managing director of the National Research Development Corporation. A technical advance, he said, might be due to either of two causes—technical or economic. The first type occurred when a new process was found to be technically possible for the first time and the second type when a technical process always known to be possible became profitable for the first time. Historically, automation was coined as a nickname for the work of a development team in the Ford Motor Company of Detroit, exploiting the technique of transfer machining. As the sizes and cutting speeds of machine tools were increased the capital charges they contributed to costs grew heavier and the incidence of idle time more onerous. In these circumstances the economic reward to be obtained by mechanically coupling the output of one machine to the input of another became larger in relation to the cost of the coupling.

This was one component of the present subject of discussion. A second component was control engineering which might be said to have started with the centrifugal governor first installed in 1778, and among recent advances associated with this control were transistors, transducers and servo-mechanism developments in the field of guided weapons. Communication technique was a third component, including computers for the passing of information to machine tools. The fourth component, as he saw it, was mechanical assembly and this was much less advanced than the other three.

In surveying the social implications of automatic factories and operations, he saw no reason to suppose that automation would do other than what every previous technological advance had accomplished. It would enable more people to be supported at a higher standard of living, or the same number with less effort for an increase in their standard of life. Nowadays manufacturing industry accounted for a minority of the working population, and only a proportion of manufacturing industry could be much affected by the growth of automation.

As far as Britain's trading position was concerned, we had to stay ahead in the technique of manufacture. So long as this was done we could compete in quality and price with other nations. The steady improvement in this technique was allied to our educational facilities, which must be increased in quality and quantity for our continued prosperity.

Automation would lead to a steady upgrading of workers and a relief from repetitive drudgery, but there was a class of labour including the coal miners and the stevedores to whom in the nature of things this relative upgrading could never apply. This class was liable to become increasingly isolated socially and psychologically if we did not succeed in solving its problems.

Advantages of Automation

After the discussion papers on Friday and Saturday, some of which are summarized later, the conference terminated in an address by Mr. F. G. Woollard, M.B.E., on "Machines in the Service of Man." He felt that the greatest gain in the adoption of automation was the much fuller utilization of machine capacity; the other gains were a saving of direct labour, economy in floor space, a lower inventory of work in progress, a greater control of processing, cheaper operating heads on machines, and automatic inspection of the workpiece. Ultimate automation —or a completely automatic factory—was unlikely to emerge in the metal working industry for a very long time, if ever. In those industries where highly advanced methods developed the shift system seemed inevitable and the men in active charge would be more akin to power station shift engineers than to foremen.

He referred to the situation in America where the unions in those industries most advanced in automation had been pressing for a guaranteed annual wage, thus cushioning themselves against major lay-offs as a result of automatic production development, and restraining employers from adopting such projects in times of employment shortage.

The unions there welcomed these developments wholeheartedly.

In an automatic factory a strike of a few key workers could be more devastating than at present in economic terms. Hand in hand with the technical developments must go improvements in our way of explaining and informing employees at all stages of change and in our relations in disputes.

He felt also that there was a dearth of young engineers to design or take charge of automatic plants and an educational campaign would be required to fill this need. It was a moot point whether these men should be mechanical engineers taught electronics or electrical engineers taught mechanical subjects: in either case they would have to know production engineering.

We summarize here some of the papers presented which we think will be of most interest to our readers.

Computers and Production

In his paper " The Computer—Electronics Contribution to Production " Mr. R. H. Booth (E.M.I. Engineering Development, Ltd.) described the reason for using a computer in the production of an article on a machine. In the case of copying an article from a prepared template, consisting of following the outline with a fixed copying stylus, only a simple proportional servo-system was needed which could operate in a variety of conventional ways. If, however, an extra requirement was added —for instance, that during the making of a steep cut the table speed should be reduced—then the arrangement was not nearly so straightforward hydraulically, but comparatively easy electronically. A further development was that instead of an article (such as a cam) being produced by reference to the shape of an existing one, coordinate dimensions describing the shape of the article to be produced could be arranged on a tape produced by a typist, and this when fed into an analogue computer could control the movement of a machine table in order to produce the requisite contour.

He doubted whether machine tools in general could be considered more accurate than one part in ten thousand and this accuracy with perhaps 2:1 in hand was that which should be aimed at in the circuits of electrical computers. Until recently this was not possible, but a new technique had recently been evolved enabling voltages (or strictly speaking their ratios) to be manipulated to an accuracy of one part in fifty thousand, or better.

Analogue computing, implying a physical representation of the quantity being computed in another physical form, was particularly appropriate when it was necessary to control continuously varying physical quantities such as the table position of a machine tool. When artificial concepts such as money were involved the digital computer was more appropriate and more similar to conventional calculation.

Digital computers could be used to extend automatic control to the working of the whole factory. Using punched tape or cards, information detailing the articles or operations to be carried out during a day or week, as necessary, could be fed into the computer together with initial knowledge of the total capacity available, and of the raw material stock of different items, etc. The output gave a total of each class of work and each type of material needed and by suitable arrangement of the computer store and the information fed in the stock position, for example, would be readily ascertainable for every item involved at every stage of a week's production. Obviously, for this sort of work computer stores might well need up to a million items of information conveniently contained in a magnetic drum. Such a drum 8in in diameter and 8in long could store a million " bits " as they were known in computer language. The paper included an appendix describing a typical example of recording information on punched tape capable of being carried out by a comparatively unskilled operator.

In a paper " Atoms, Electrons and Automation " Mr. A. G. Peacock (Mervyn Instruments Co., Ltd.) said that one important factor in favour of electronic controls was that a small but extremely robust sensing device could be used whose output, although minute, could be magnified by electronics many thousands of times. A second factor was the extreme flexibility of electronic controls. Today almost any physical quantity could be converted into an electrical output, and this combined with the third property of electronic systems, the ease with which they could incorporate feed-back, would bring them increasingly to the fore. He went on to describe detailed applications such as obtaining register in colour printing, package monitoring, the detection of embedded metallic particles in food, etc., and, of course, the automatic pilots and other devices used in aircraft operation.

Before the war electronic techniques were often suspect because of the domination of design by contemporary radio practice. Equipment was not made sufficiently robust for constant use, and it appeared that users expected the price to be related to that of domestic equipment produced in large quantities. Advances were being made away from this trend at the present time, but it always had to be borne in mind that reliability was expensive. Serviceability required increasing attention and interchangeable plug-in units were finding wider acceptance. The expanding use of electronic equipment in industry had already shown the need for a new type of maintenance engineer and the demand for this class of skilled labour might well bring about a major redeployment in the factory of the future.

The author then described some recent applications of radioactive materials in industry, these being capable of use as highly sensitive detecting devices used in conjunction with electronic apparatus. In conclusion he felt that the electronic engineer and the production engineer needed to co-operate more closely in the future to solve the complicated problems ahead.

Machine Tool Control

Mr. D. T. N. Williamson (Ferranti, Ltd.) presented a paper on " Computer-Controlled Machine Tools." He referred to the direct contribution that could be made by digital computers to the efficiency of small quantity production in the engineering industry by the control of metal working processes. They could give rise to universal machine tools in which setting-up time was so short that the efficient automatic production of small jobs and even of single components could be achieved. Prototypes were now being tested and a considerable number of machines would be put into workshop service during 1956.

The author described in some detail the system employed for the control of a milling machine and divided the system into four stages: firstly, the transference of the drawing information along with machining data to a standard planning sheet; secondly, the coding of this planning sheet on to punched paper tape; thirdly, the production from this paper tape of a recorded magnetic tape by means of a digital computer; and fourthly, the use of this magnetic tape to control the machining operation.

An article was designed and a drawing made in the usual manner except in the method of dimensions being given from a datum and including the co-ordinates of points of change. This went to the planning engineer for the preparation of a routine planning sheet for the technique which, in its turn, went to a typist for transfer

of the data into the form of a punched tape. This was fed into a computer which calculated the required path of the centre of the cutting tool in three dimensions at all instants and gave the output in each co-ordinate in the form of a train of pulses each corresponding to a very small unit of movement, usually one ten thousandth of an inch. These pulses were recorded on three separate channels on magnetic tape and simultaneously on a fourth channel control information appertaining to the functions of the machine other than slide movements was recorded.

A servo-mechanism allied to the machine translated the pulses from the magnetic control tape reader into accurate slide movements. Positional feed-back from the table was obtained from an optical grating and direction discriminator.

The paper described the method of positional measurement of the article on the machine, the author's company having developed a grating using a specified number of lines per inch. The use of gratings with 5,000 lines per inch made it a simple matter to move a slide consistently to an accuracy of one ten thousandth of an inch. In use one length of grating was attached to the machine table and a short length of the same grating attached to the other section of the slide, so that one grating traversed the other with the two surfaces almost in contact. When a beam of parallel light was projected through the pair of gratings and they were suitably aligned, the Moiré fringe pattern produced modulated the light transmission when there was relative movement. A complete cycle of intensity variation occurred for a movement equal to the pitch of the grating, and by arranging two photo cells so that the phase of this line variation was different in each, a two-phase electrical system was formed, the total number of cycles of which represented the distance moved, the frequency represented the velocity, and the direction of phase rotation revealed the direction of movement of the slide.

The system described had been in partial operation for several months and preliminary results showed that an overall accuracy of $\pm$ 0·0005in should be achievable with good quality standard machine tools.

The author referred to the design of machine tools which had not changed radically for many years and so in general were unsuitable for very accurate automatic control. The use of kinematic elements such as re-circulating-ball nut and leadscrew assemblies, spring loaded to the level of the maximum loads to be encountered, could improve accuracy and the transmission efficiency of the slide and drive system.

He gave examples of the savings made possible by the use of these new techniques. For instance, a three-dimensional cam for a turbine blade miller taking three weeks to make by present methods could be planned, computed and machined in four hours without the need for hand finishing. Milled block wave guide structures normally employing a skilled machinist for two weeks could be completed, including planning, in one hour. He estimated that in the production of many items the use of two computer-controlled machine tools was equivalent to a machine shop containing about ten conventional machines, and he felt that developments in this field would find increasing application during the next few years and need not necessarily be confined to large organizations.

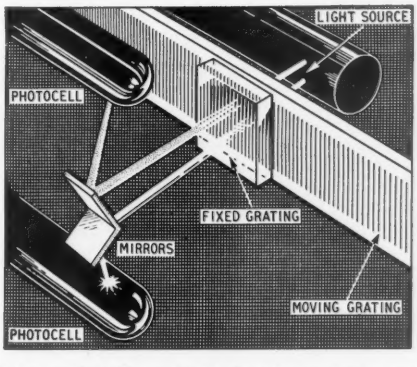
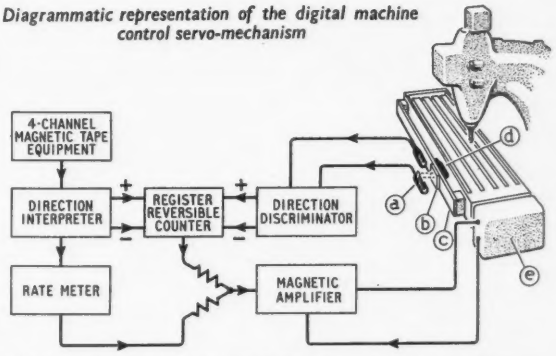


Diagram of the Ferranti optical grating measuring system

Diagrammatic representation of the digital machine control servo-mechanism



(a) Photocells, (b) Fixed grating, (c) Moving grating, (d) Light source, (e) Motor tachometer

Automatic Electronic Control

In a paper "Automatic Electronic Control of Machine Tools," Mr. J. A. Stokes (British Thomson-Houston Co., Ltd.) first discussed relatively simple variable speed drives mainly for feed control, an example being given of a large boring mill in which the electronic equipment was housed inside the hinged arm and controlled the cross-feed of the main head along the arm. This type of control could provide very accurate speed matching and the wide range of improved speed available eliminated much gearing and permitted the operator to change the feed speed while cutting.

He referred to the measurement of machine tool slide position by the use of end rods—a set of measuring bars cut or adjusted to a length corresponding to the distance at which the slide was required to position itself from a chosen fixed datum point. The slide was power driven towards the datum until the end rod was contacted to operate a limit switch stop on the slide. He also described the system of measurement using electromagnetic methods. This system used a length of measuring bar of magnetic material having a series of holes bored one inch apart and filled with non-magnetic inserts. This was mounted on one portion of the machine while the detector head was mounted on the adjacent portion. The detector head consisted of a differential transformer carried on a small slide-way along which it could be driven in either direction by a small electric motor.

The operator's control desk had a set of six dials on which the ordinate dimension could be set up manually, the dimension then being displayed as a row of digits, e.g., 12.3456. The four dials corresponding to the decimal portion of the dimension operated a set of master synchros which co-operated with a corresponding set geared to the detector head drive. The detector head was driven by its motor until these synchros were in alignment, thus positioning the detector head in accordance with the decimal portion of the dimension.

The two dials displaying the integer portion of the dimension drove a single master synchro which co-operated

Electronically controlled drilling machine ; the required positioning of the worktable is set up initially on the control desk

with a corresponding synchro on the main leadscrew drive gearbox, and controlled the power drive until the slide travel was within about ¼in of its correct position, when control of the drive was transferred to the detector head. The positioning process was complete when the poles of the detector head were symmetrically disposed with respect to the nearest hole.

Mr. Stokes spoke of the problem of three-dimensional control in which the three mutual perpendicular feed mains were under simultaneous tracer control. He compared the case for a model as the source of the " shape " information with data magnetically recorded. The model could be more readily understood and modified if required on the shop floor, and the operator had a better visual check that the work was proceeding correctly; but against this the use of magnetic recorded data could double the capacity of a machine tool and enable it to be worked at maximum capacity. It should also be more accurate. He also raised the problem of mechanical design of machine tools and felt that if optimum results were to be obtained machine tools employing automatic control should be designed throughout with their operating conditions in mind and the automatic features should not be regarded as mere attachments.

Automatic Inspection

A paper on " Automatic Inspection—the Anatomy of Conscious Machines," by J. A. Sargrove and P. Huggins, dealt with the automatization of the inspection process in conjunction with production. The authors divided production faults into three classes: those of a sporadic, a repetitive and a " trenditional " nature. They described the rise of optical systems in conjunction with photo-electric cells and amplifiers to produce either pass/reject inspection or grading of inspected items, when either one or a few dimensions or features had to be checked. For some purposes such as gas turbine blades as many as a hundred dimensions might need to be checked quickly and for this an electronic detecting device, as distinct from a photo-electric one, would be used.

It was possible to include a statistical analysis control unit as part of the automatic inspection arrangement. This was in effect a small computer to examine the type of error occurring, and any trend it might have to repeat or worsen, and which could take action to correct the producing machine in order to overcome this trend. It was important, however, that these inspection devices should be designed into the whole automatic conception at the start and not added later.

Reflections on the Conference

What conclusions could one draw at Margate? Two themes perhaps dominated the discussions: firstly, a wariness of novelty, a lingering doubt of just how reliable electronic apparatus had been to date and would be in the future when used on the shop floor; secondly, awareness of how important was education of workers, planners and managers when actually confronted with their new tools; and of the swelling tide of technicians, engineers and scientists demanded in the future.

One of the more particular thoughts widely held was the importance of designing production units as a whole—of radically re-designing a machine tool, for instance, to take the most advantage from electronic control, and perhaps adjusting the product design as well. A much closer co-operation between mechanical engineers, electronics engineers and mathematicians was needed.

Clearly a considerable difference of opinion exists as to the relative merits of the analogue and digital computers. On the one side it was felt that digital computers were more accurate but that their physical size and complexity had necessarily to be considerable. On the other side an analogue computer for a machine tool could be fitted in half a rack-bay but might not be so accurate or so flexible in its uses.

In the social sphere, and in passing, it should be said that never before has such a gathering of engineers considered so deeply the social implications of their work; it seemed evident that better working conditions, shorter hours and an improved standard of living for everyone was the assured result. The successful spreading of this gospel in their own factories, and securing the real co-operation of their workers, was an obvious worry to many managers. As Mr. Fletcher of the T.U.C. stressed, the way in which the unions reacted to these developments lay 95 per cent in the hands of management.

High Power Wind Tunnel

A MAJOR feat of electrical construction has been achieved in the new 10,000 h.p. supersonic wind tunnel at the Whitley, Coventry, guided missile plant of Sir W. G. Armstrong Whitworth, Ltd., which Lord Brabazon of Tara opened on 13th June. The tunnel electricity load is about one-tenth of the peak load of Coventry, but it will only be run at light-load periods.

Designed and constructed by the company's scientists and engineers under the direction of Dr. W. F. Hilton, the tunnel will enable experts to watch, photograph and record what happens to aircraft and guided missiles when they reach the " heat barrier " speed at which heat generated by motion begins to distort the structure. Developed at a cost of about £200,000, the tunnel is housed in a specially constructed building and is the country's first large scale unit designed and built under private enterprise. It is capable of giving a continuous wind flow at three times the speed of sound, and will be used for testing rockets, jet engines, guided missiles and 2,000 m.p.h. aircraft in their design project stage.

Scientific Libraries

SOURCES OF TECHNICAL INFORMATION

By R. ROBERT, A.C.I.S.

As far back as 1948 the Scientific Conference of the Royal Society proposed the creation in this country of a "National Reference Library of Science and Invention," or central repository of the mass of scientific knowledge now accumulating in so many spheres. While there is a possibility that steps to this end may be taken quite soon (with Government aid), in the meantime the position is not altogether satisfactory. The engineer, scientist or research worker in need of information may have to search hard and long in half-a-dozen different places.

The world's greatest library is said to be the French *Bibliotheque Nationale*, in Paris, and our own British Museum, occupying an area of eleven acres in Bloomsbury, comes an easy second. Accommodated on the shelves, and in the presses, of the "B.M." are upward of six million books, and a copy of every new book published must find its way there to secure copyright protection. But it is not specifically a scientific library, and access to the Reading Room is subject to certain restrictions.

Libraries of Professional Bodies

A book on some scientific subject may often be obtained through the local library services, which are, nowadays, extremely good. But it is not always the information in books that is required. New technical developments, or the results of painstaking research, are frequently only to be found in rare monographs, brochures or periodicals. These may be difficult, if not impossible, to come by through the ordinary library service.

In such cases, an obvious first move would be to ask the librarian of one of the numerous specialist libraries now in existence. For example, an electrical engineer might well find the statistics, the mass of data, or the isolated fact, for which he is looking, through the good offices of the Institution of Electrical Engineers, and whether he is a member or not it is fairly certain that a courteous inquiry would result in useful assistance of some kind.

A few of the more likely professional bodies that leap to mind at once are: The Institute of Marine Engineers, the Institution of Civil Engineers, the Institution of Mechanical Engineers, the Institution of Mining Engineers, and there are many others which will have invaluable specialist material at their disposal. Nor should groups such as the Iron and Steel Institute, the Textile Institute, and the Welding Institute be overlooked.

Scientific Societies and Research Associations

Britain is fortunate in having several learned societies whose avowed object is the advancement of all branches of science. Outstanding among them is the Royal Society, founded in 1660, whose "Philosophical Transactions" and "Proceedings" have won world-wide repute. The Society, with headquarters at Burlington House, London, W.1, has an extensive library, comprising not only 150,000 volumes but a great many scientific periodicals. The Chemical Society, housed in the same building, has 52,000 books dealing with pure and applied chemistry and related subjects. This library also contains the Faraday and Roscoe collections, and the Nathan collection on firearms and explosives. The Royal Astronomical Society has a fine collection of works on astronomy and geophysics.

With the developing tendency towards specialization in science, numerous associations have inevitably sprung into being to serve the needs of particular industries. Such are the British Electrical and Allied Industries Research Association, the British Non-Ferrous Metals Research Association, the British Aluminium Development Association, the Motor Industry Research Association, the Research Association of British Rubber Manufacturers, to mention only a few. All engage in useful work of a technological nature, and all have gathered literature appropriate to their particular interests. One of these societies, at least, has declared its willingness to consider inquiries from non-members on their merits, and this probably applies in a majority of cases.

Science Museum

A great deal might be written about the wonders of the Science Museum, South Kensington, the galleries of which are an inexhaustible mine of information, both for the advanced research worker and for the student. The library has no fewer than 300,000 books, the majority being devoted to pure and applied science. Not only does the Museum maintain its own subject catalogue, but an index to scientific books and periodicals in general, and this can be most helpful. Tickets of admission to the library are readily granted on request.

Patent Office Library

This brings us to a brief consideration of the Patent Office library, which is celebrating its centenary this year. With its 300,000 volumes, and unique collection of technical journals, it is perhaps *the* finest scientific library in the country.

The Patent Office is, of course, the place in which patents, and applications for patents, are published. Anyone wishing to oppose the granting of a patent may do so, and it was to facilitate search into claims that subscriptions were first made to a wide variety of technical journals. These are not only British but come from all over the world, and the past files of periodicals, in many languages, constitute a treasure house of scientific knowledge with few, if any, equals.

An excellent feature of the current files of periodical literature is that they are conveniently arranged to surround tables in the centre of the library, and are on the "open-access" system, which is of inestimable advantage to all concerned.

One other point is well worth mentioning in connection with the Patent Office library, and that is the recent installation of a punched-card machine, the object of which is to assist in the compilation of a fifty-year subject-matter record. Preparation of this record is proceeding, and is being kept up to date. Some 36 classes of patents, consisting of approximately 4,000 classification marks, are already available to the public. This is a service which should be of great help to anyone having to make exhaustive searches through patent specifications.

THE LINEAR ACCELERATOR

Mode of Operation Simply Explained

INCREASED use of linear accelerators is now being made in hospitals in this country for X-ray photography. The present design of these is based on work originally carried out by the Telecommunications Research Establishment at Malvern. To aid in the understanding of these machines by those to whom they are strange or new, Mullard, Ltd., in conjunction with the Educational Foundation for Visual Aids, has had a short film prepared explaining clearly and simply the mode of operation. We are printing below the commentary from this film together with many stills taken from it as we feel the concise explanation will be of interest to our readers.

An atomic nucleus is surrounded by a strong repulsive electrical field. This defensive field can only be penetrated by particles travelling at very high speeds. To study nuclear transmutations a plentiful supply is needed of these high speed particles, at energies which can be varied. When accelerated electrons strike a solid, X-rays are produced. The faster the electron, the harder the X-ray. (Fig. 1).

The first nuclear transmutations with laboratory-accelerated particles were produced by Sir John Cockcroft and Professor E. T. S. Walton. Charged hydrogen nuclei were accelerated with a high voltage, produced by the use of transformers, condensers and rectifying valves. High voltages needed for the acceleration of particles have also been produced by electrostatic machines of the Van de Graaff type, which are similar in principle to the Wimshurst machine.

But to study interactions between fundamental particles still higher particle energies are needed and so it has been necessary to produce more and more powerful equipment. Such machines do not rely on the production of high voltages directly. A high ultimate energy is achieved either by moderate voltages applied equally to the particle a large number of times, or by accelerating the particles in a moving field. This latter type of equipment is known as the travelling wave linear accelerator. (Fig. 2.) This machine provides a silent, compact, high intensity source of X-rays for therapy and nuclear research.

The method of operation is seen in Fig. 3. An electron gun produces streams of electrons. The electrons cannot travel through air without colliding with other particles. But if the gun is inserted into one end of a long cylindrical tube, which is then exhausted of air, the electrons will continue on their paths, towards the other end of the tube. This end carries the target, which the electrons are required to hit. Most of them would miss the target but by surrounding the tube with a focusing coil, the electrons are directed along one central path and they all hit the target (see Fig. 4).

In the linear accelerator, the electrons hit the target at almost the speed of light, "c." The velocity of the electrons produced by the gun depends on the voltage at which the gun is operated. For instance, a potential of 50,000 V would produce electrons travelling at 40 per cent of "c." (Fig. 5.)

Fifteen million V would be needed to achieve 99·95 per cent of "c," but for electro-mechanical reasons this is impracticable. Forty per cent of "c" is easily achieved, and does not involve serious insulation problems. Electrons at this velocity can be further accelerated by the use of energy from another source.

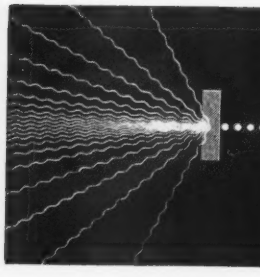


Fig. 1

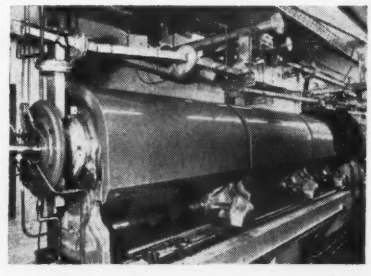


Fig. 2

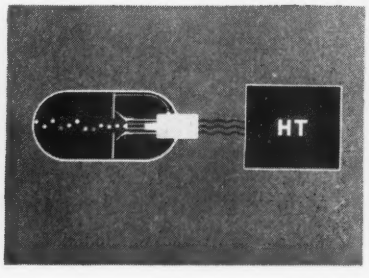


Fig. 3

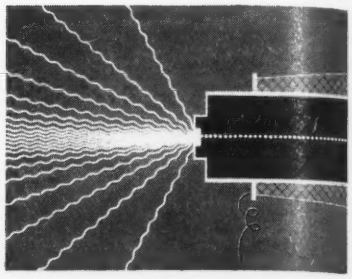


Fig. 4

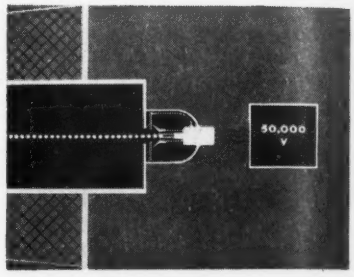
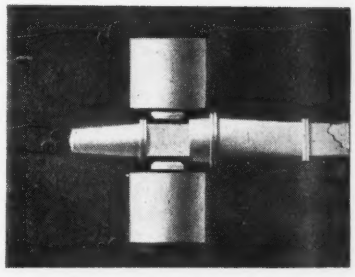


Fig. 5



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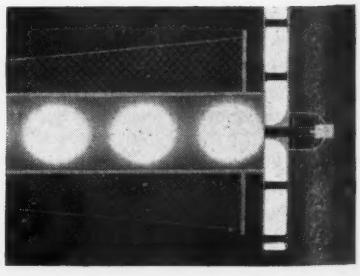


Fig. 7

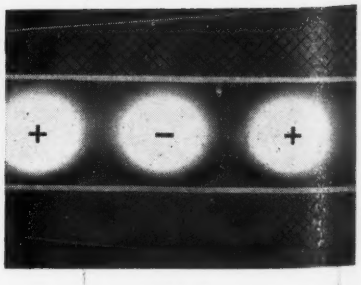


Fig. 8

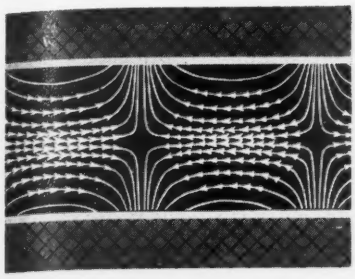


Fig. 9

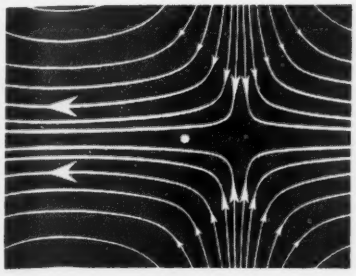


Fig. 10

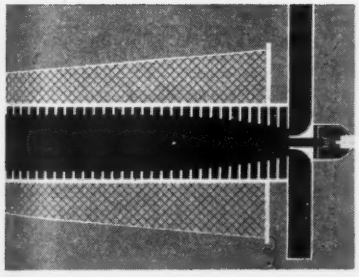


Fig. 11

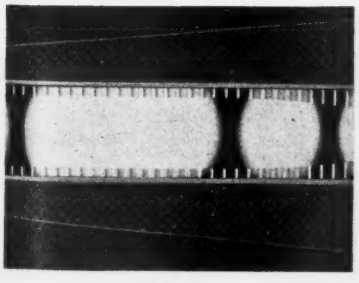


Fig. 12

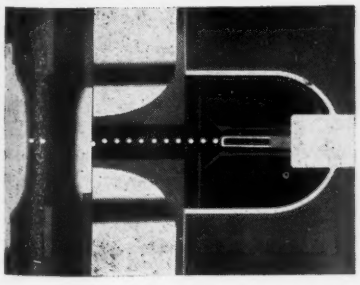


Fig. 13

A magnetron can produce a high power electro-magnetic wave without the use of extremely high voltages. (Fig. 6.) The wave is fed into a rectangular wave guide, where it adopts this form. It is conducted to the door-knob transformer, situated in front of the electron gun. The transformer passes it on into the cylindrical tube, which also behaves as a wave guide, where is now adopts this form (Fig. 7.) The field due to this wave is alternately positive and negative. (Fig. 8.) The electro-magnetic field strengths and directions of operation of the wave are like this. (Fig. 9.)

The electron is a negatively charged particle. If two electrons are brought together mutual forces will thrust them apart. Also, if two positively charged particles are brought together mutual forces will thrust them apart. But if a positively charged and a negatively charged particle are brought together they will be mutually attracted. If a positive field is substituted for the positive particle the electron will be drawn through the field.

Now suppose that the field were moving along the cylindrical wave guide at the same speed as the electron arriving from the gun. (Fig. 10.) At first the electron would accelerate while being drawn through the accelerating positive field. It would then come under the retarding influence of the negative field immediately ahead. But if the h.f. wave were made to accelerate with the electron, the electron would not come under the retarding influence of a negative field. While it is in this position, the electron will be gaining maximum energy, and constantly accelerating. So to keep it in this position, the wave must also accelerate at the same rate.

Control of wave velocity is achieved by loading the cylindrical wave guide with iris plates. (Fig. 11.) These are spaced at equal intervals along the tube, their apertures increasing towards the target end.

The wave in the rectangular wave guide is travelling at a phase velocity of 140 per cent of "c." On entering the cylindrical wave guide, corrugated by the iris plates, each field of the wave is slowed down to 40 per cent of "c," which is the injection velocity of the electron. (Fig. 12.) Then the changing guide dimensions in the iris plates permit the fields to accelerate. By the time they reach the target end, the phase velocity is 99.95 per cent of "c." The surplus h.f. energy is returned to the system by other guides.

Now, if electrons were injected into the positive fields under these conditions, they would gain energy progressively. But electrons do not emerge from the gun at favourable intervals to position themselves correctly. They come out in a continuous stream. (Fig. 13.) Those which are injected into a retarding field will be rejected and lost. (Fig. 14.) Those which are injected into an accelerating field will bunch together and continue to gain energy from the h.f. wave. So finally, groups of electrons will strike the target at a speed of 99.95 per cent of "c," and hard X-rays will radiate from it.

The surplus h.f. energy is fed back from the target end through a subsidiary wave guide to a device known as the "Rat-race," and recirculated with the power from the magnetron. (Fig. 15.) During its journey down the tube, each particle increases its mass thirty times.

Fig. 16 shows a 4 MV linear accelerator, installed in a hospital at Newcastle. In this case the machine is mounted on a gantry which allows the X-ray head to move around the treatment table, which can be raised, lowered, rotated and moved horizontally. In the adjoining main control room, a pump (in series with an oil diffusion pump mounted on the gantry) maintains a vacuum in the wave guide system of one three hundred millionth of an atmosphere.

The X-ray technician brings the machine into correct running form on this main control panel. (Fig. 17.) Here he controls the voltages, the modulator wave forms and the focusing of the electron beam in the accelerator. In

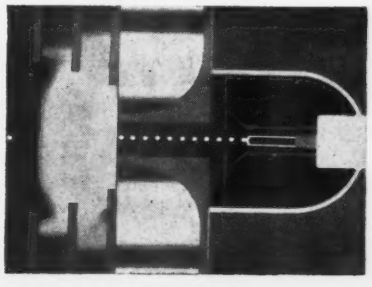


Fig. 14

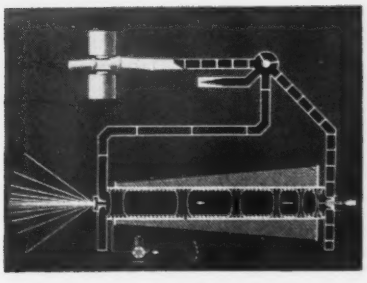


Fig. 15

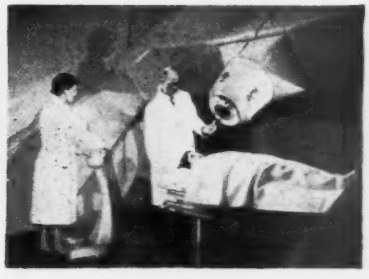


Fig. 16

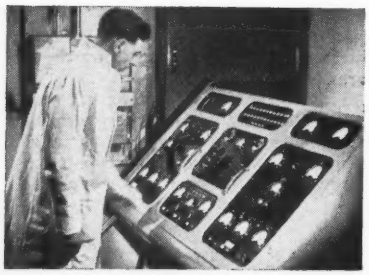


Fig. 17

Fig. 18

the treatment room, the patient is set up accurately in position. (Fig. 18.) The gantry travels in an arc so that the beam of radiation will always pass through the same point in space. A flexible pointer on the X-ray head ensures that the patient is placed at the correct distance, and indicates the point on the skin at which the beam must enter to reach the part of the body receiving treatment. Another pointer shows where the beam will emerge. Both pointers are removed before treatment begins, and everyone but the patient must leave the treatment room, to avoid danger from sustained exposure to radiation.

The machine counts the dose of units in 10 roentgens, and switches off automatically when the pre-set dose has been given. Apart from its clinical use, the linear accelerator is an important advance in the development of research in nuclear physics.

NEXT WEEK'S EVENTS

Monday, 27th June

LONDON.—St. Ermin's Hotel, Caxton Street, London, S.W.1. Association of Electrical Machinery Trades. Annual meeting and luncheon (luncheon at 12.45 for 1 p.m.).

Monday, 27th June, to Friday, 1st July

BRIGHTON.—British Electrical Power Convention.

Tuesday, 28th June, to Saturday, 9th July

LONDON.—Earls Court. British Instrument Industries Exhibition.

Wednesday, 29th June

LONDON.—Management House, 8, Hill Street, 7 p.m. British Institute of Management. "The Scientific Method and Human Relations," by Prof. C. A. Coulson.

SUFFOLK.—Thorpeness Golf Club. Norfolk and Suffolk area final, Electrical Industries National Golf Championship.

FUNCTIONS DURING 1955-56

Electrical and allied events are becoming more numerous each year, and many electrical men who have to plan their engagements well in advance may be glad to know of functions and other important events which have so far been arranged by the various organizations in the industry during the 1955-56 season. For their guidance we list below those of which we have already been notified. This list is not, of course, complete, neither does it include the ordinary sessional meetings of the various bodies; these will appear in our "Next Week's Events" section in the issue immediately preceding the dates of the meetings. Organizations who have not already notified us of social functions they propose to hold are asked to do so immediately they have been decided upon and so avoid clashing with other important functions.

Association of Mining Electrical and Mechanical Engineers—12th-15th June, 1956: Annual convention in London.

Association of Supervising Electrical Engineers—18th October, 1955: Presidential address at the Institution of Electrical Engineers, London. 16th November, 1955: Annual joint lecture with the Institution of Engineers-in-Charge at the G.E.C., Magnet House, W.C.2. 10th December, 1955; Ladies' night at Park Lane Hotel, Piccadilly, W. 20th-24th March, 1956: Electrical Engineers' Exhibition at Earls Court. 6th April, 1956: Annual dinner at the Connaught Rooms, W.C.2. 12th and 13th May, 1956: Annual conference at Brighton.

Batti-Wallahs' Society—16th March, 1956: Ladies' night.

British Electrical and Allied Industries Research Association—2nd May, 1956: Annual general meeting and luncheon (provisional).

British Electrical and Allied Manufacturers' Association—16th November, 1955: Annual dinner at Grosvenor House, London, W. 19th April, 1956: Annual general meeting at the Connaught Rooms, London, W.C.2.

The Dynamicables—Dinners have been arranged for 9th November, 1955, and 8th February and 18th April, 1956.

Electrical Association for Women—Week commencing 16th April, 1956: Annual conference at Cheltenham (provisional).

Electrical Contractors' Association—14th February, 1956: Annual dinner at Grosvenor House, London, W.

Electrical Industries Benevolent Association—11th November, 1955: Annual ball at Grosvenor House, London, W.

Electrical Power Engineers' Association—25th November, 1955: Annual dinner.

Electrical Wholesalers' Federation—Week commencing 26th September, 1955: Council visit to Scottish Section at North Berwick with members of E.L.M.A. and C.M.A. 15th March, 1956: Annual general meeting and annual dinner at the Dorchester Hotel, London, W.

Illuminating Engineering Society—8th to 11th May, 1956: Summer meeting at Harrogate.

Institute of Fuel—12th October, 1955: Annual dinner and dance at the Connaught Rooms, W.C.2. 18th April, 1956: Annual general meeting and presidential address. 25th April, 1956: Annual luncheon at Connaught Rooms, W.C.2.

Institute of Marine Engineers—2nd December, 1955: Annual conversazione at Grosvenor House, London, W. 10th December, 1955: Junior Section dinner and dance. 9th March, 1956: Annual dinner at Grosvenor House, London, W. 20th March, 1956: Education Group annual general meeting at the Institute. 24th April, 1956: Annual general meeting at the Institute.

Institution of Civil Engineers—23rd June, 1955: Conversazione. 21st and 22nd September, 1955: Conference on the Correlation between Calculated and Observed Stresses and Displacements in Structures. 18th-22nd June, 1956: Conference on Civil Engineering Problems in the Colonies.

Institution of Electrical Engineers—6th October, 1955: President's address. 8th November, 1955: Measurements Section dinner. 18th January, 1956: Utilization Section dinner-dance. 23rd February, 1956: Institution annual dinner. 9th March, 1956: Supply Section dinner-dance (provisional). 9th-13th April, 1956: Convention on Digital Computer Techniques. 26th April, 1956: Kelvin Lecture. 3rd and 4th May, 1956: Symposium on Electrical Equipment of Aircraft. 21st June, 1956: Institution conversazione.

Institution of Heating and Ventilating Engineers—8th February, 1956: Annual dinner.

Institution of Mechanical Engineers—20th October, 1955: Annual dinner. 21st October, 1955: Opening meeting of the 1955-56 Session and presidential address. 25th-27th October, 1955: Conference on Combustion.

Radio Society of Great Britain—23rd-26th November, 1955: Annual Amateur Radio Exhibition at the Royal Hotel, Woburn Place, W.C. 16th December, 1955: Annual general meeting at the Institution of Electrical Engineers.

International Lighting Conference

FROM A CORRESPONDENT

THE thirteenth session of the International Commission on Illumination (Commission International de l'Eclairage or C.I.E.) was held in Zurich from 13th to 22nd June. Over 500 delegates attended the meeting, representing Australia, Austria, Belgium, Brazil, Canada, Czechoslovakia, Denmark, Finland, France, Germany, Great Britain, Iceland, Ireland, Israel, Italy, Japan, Holland, Norway, Poland, Russia, South Africa, Spain, Sweden, Switzerland, Turkey, the United States and Yugoslavia. This was a record attendance for a C.I.E. meeting and the number of nations represented was greater than ever before. The greatest number of delegates was from Great Britain with 109, led by Dr. S. English.

The C.I.E. is an independent international body supported by most countries which appreciate the importance of lighting. The Commission grew out of the former International Photometric Commission and it held its first meeting in 1921 when the total number of delegates was 24 and seven countries were represented. Since then it has endeavoured to hold meetings at roughly three-yearly intervals, though a long gap was caused by the war.

Its activities have grown considerably with the great progress and development in light sources and lighting applications during recent years and the record attendance at this year's meeting may be taken as an indication of the growing interest in and importance of lighting throughout the world. In fact its scope has widened so much that the Commission itself is now seriously considering the form its future activities should take.

Initially interested in photometry, the emphasis has now swung over to practical applications and even on the more scientific side it is more concerned with such practical matters as the colour rendering properties of fluorescent lamps than with the more straightforward problems of photometric standards and procedure.

The C.I.E. has grown up by the efforts of those who were interested in the exchange of information on lighting between countries and this is still its main function. It provides a platform for people to meet and to discuss and study all matters related to lighting. Different countries take on the task of collecting information on various subjects and preparing reports thereon for submission at these meetings. Papers are also presented at the meetings but these are usually review papers, the view being held that all original work should first be reported and published in the country of origin.

The Commission has no mandatory powers but it does from time to time make recommendations regarding standardization or subjects for special study which are then taken up by the appropriate national or international standardization bodies. In addition to the swing from purely photometric matters to the application of lighting, the Commission is also becoming increasingly concerned with the physiological, psychological and æsthetic aspects of lighting, the importance of which is now being appreciated by all countries.

Opening Session

The meetings at Zurich were held in the Congress Hall which has excellent facilities. An innovation was the use of simultaneous translation; the three official languages are English, French and German and at previous meetings much time has been wasted by translations of reports and contributions to discussions. A lot of time was therefore saved, though with all delegates listening intently to their headphones a certain amount of co-ordination amongst national delegations appeared to be lost.

At the opening meeting on 13th June, after speeches of welcome from various officials of Zurich, the conference was addressed by its president, Dr. Ward Harrison (United States). After recalling the history of the C.I.E. he said that since the last meeting in Stockholm in 1951 four more countries (Brazil, South Africa, Israel and Japan) had formed National Committees and had been admitted to membership. The problem now faced by the Commission was that it had grown so much that it was necessary to overhaul its constitution and scope and to decide what its future should be. He referred to some suggestions from the Secretariat to the effect that the C.I.E. should be reformed so as to provide greater service to users of lighting, with a full time headquarters staff. (These proposals were to be discussed in detail by the executive committee during the course of the meeting.)

Nomination of President

The presidency of the C.I.E. changes at each meeting and in the past it has been the practice to nominate and elect the new president at the closing plenary session. Dr. Harrison said that this time the executive were unanimous in their choice of nominee to fill the office for the next three or four years and he therefore felt able to make the nomination at the beginning of the meeting instead of at the end. Their choice was received with acclamation, the name being Dr. J. W. T. Walsh, of Great Britain. Dr. Walsh has been associated with the C.I.E. for very many years and his nomination (yet to be confirmed) is a well deserved honour. (Incidentally Dr. Walsh is the only person to have twice been president of the Illuminating Engineering Society.)

In the afternoon three papers on vision were given by speakers from the United States and Holland.

On the second day of the meeting the programmes of the sub-committees on different subjects began in real earnest. The sub-committee on industrial lighting reported on progress and developments since 1951 which included the increasing use in all countries of hot cathode fluorescent lamps with combined tungsten and mercury lighting for high-bay installations. Developments in different countries appeared to be very similar; the new de luxe and new warm white fluorescent lamps seem to have been well received by users and the British practice of some years' standing of designing fittings so that some of the light output is in an upward direction to illuminate the ceiling now seems to have been widely adopted.

Consideration of the comfort of those who have to work under industrial lighting installations is now regarded as one of the most important factors in design. The British committee which prepared this report was unable to offer any convincing evidence that better lighting in factories improved output or affected the morale of the workers; an American speaker however gave figures illustrating reduction in accidents by as much as 32 per cent in a heavy engineering plant whilst redecoration at a later stage had

resulted in a further decrease of 16 per cent. Other speakers also emphasized the need for proper colour schemes which should be designed in conjunction with the lighting.

When replying to the discussion Mr. H. C. Weston, who presented the report, said that this was really part of the current trend in thought that the lighting engineer should not confine his advice to lighting alone but should be in a position to advise on the environment of interiors as a whole—though he felt that it would be some time before users could be educated to make use of the lighting engineer in this way.

Railway and dock lighting was another subject on which a British report was submitted. As presented in pre-print form, however, the report had been greatly condensed from the original document submitted and it was felt that much of its usefulness had been lost. Nevertheless there was a useful discussion on types of lamps and fittings to be used and the most satisfactory methods of mounting them.

A most important subject which has been of concern to the C.I.E. during recent years is that of lighting in coal mines. This subject has been studied at great length not only in Great Britain but in many other countries where the mining of coal is an important factor in the economic life of the country. The specific problems associated with lighting in mines vary in different countries according to the conditions that prevail; for example in some countries where the mines are gas free the stringent regulations necessary in Great Britain are not required.

In Great Britain during the last five years the electric hand lamp has almost disappeared in favour of the cap lamp; the use of pneumatic-electric lamps is on the increase in this country where work is also going on in the use of mains lighting which is widely used in the United States. France reported the introduction of a xenon filled miners' lamp with a greater efficiency than that of the krypton filled lamp.

Several papers on aspects of mine lighting were also given, one being by Mr. W. J. Wellwood Ferguson of Great Britain who is probably the only person ever to have given papers at three successive meetings of the Commission on the same subject—that of mine lighting and miners' nystagmus.

Other sessions on the Tuesday dealt with signal lights and their colours, and airborne lighting and signals. Colour, whether it is of lamps or signals, is a subject which always leads to plenty of discussion, usually spread over several days. It is doubtful whether any recommendations from committees dealing with colour will be available until towards the end of the meeting in Zurich.

Lighting Education

Education in schools and technical colleges was the subject of one meeting on the Wednesday morning. It appeared that none of the national committees was satisfied with the past activities of the Commission in the matter of education. There is a feeling in some countries (and in fact it was mentioned in the draft recommendations of this sub-committee) that efforts should be made amongst educational authorities to include lighting as a subject at secondary school level on the grounds that many trades and professions are concerned with some aspect or other of lighting; and further that lighting should be studied in greater detail in technical college and university courses.

It was pointed out, however, that though many professional men, e.g., architects and electrical engineers, are concerned with lighting, no useful purpose would be served by attempting to incorporate into their already full courses of training a detailed study of lighting; rather the aim should be to produce well qualified lighting engineers from those who have already received a proper basic training and that other professions should be made aware during their training of the importance of lighting and of the help and advice which could be given by the lighting engineer with the necessary specialist training. One point which came out of the discussion was that before attempting to organize general courses on lighting it was first necessary to train the teaching staffs—a problem which would appear to be common to most countries.

The question of the education of the public in the importance of good lighting was also discussed and practice in different countries was reported. The importance of training retail sales staffs in the elements of good lighting was emphasized.

As expected, the session on street lighting drew a very large audience. A report on practice in different countries was presented by Mr. J. M. Waldram. He said that all countries were only too conscious of the need for better street lighting to reduce the number of road accidents by night; he thought that more progress might be made if the results of research in different countries could be made more widely known as at present it was apparent that some countries were undertaking research on various matters which had already been studied in other countries.

On the use of light sources and materials he mentioned the increasing employment of fluorescent h.p.m.v. lamps in Europe and the use now being made of aluminium and plastics for lanterns. He said that it was almost impossible to obtain any reliable comparative figures on costs of different types of installations in different countries, and indeed even within any one country. He thought that the preparation of a standard basis for cost comparison might form the subject of a special study.

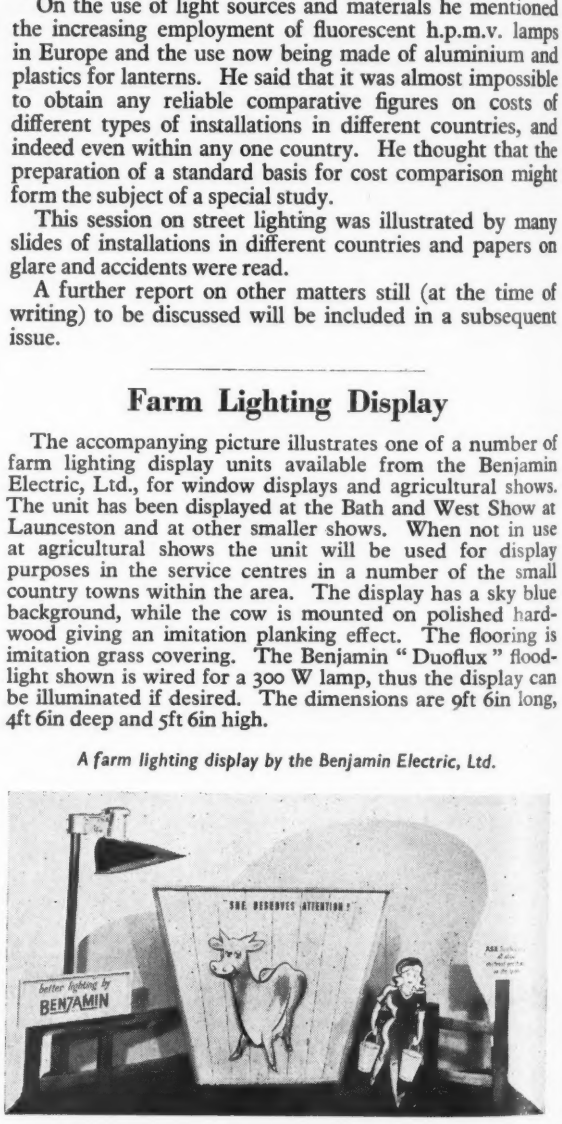
This session on street lighting was illustrated by many slides of installations in different countries and papers on glare and accidents were read.

A further report on other matters still (at the time of writing) to be discussed will be included in a subsequent issue.

Farm Lighting Display

The accompanying picture illustrates one of a number of farm lighting display units available from the Benjamin Electric, Ltd., for window displays and agricultural shows. The unit has been displayed at the Bath and West Show at Launceston and at other smaller shows. When not in use at agricultural shows the unit will be used for display purposes in the service centres in a number of the small country towns within the area. The display has a sky blue background, while the cow is mounted on polished hardwood giving an imitation planking effect. The flooring is imitation grass covering. The Benjamin "Duoflux" floodlight shown is wired for a 300 W lamp, thus the display can be illuminated if desired. The dimensions are 9ft 6in long, 4ft 6in deep and 5ft 6in high.

A farm lighting display by the Benjamin Electric, Ltd.



All-Electric Flats

Eight-Storey Block with Under-floor Heating

THE South of Scotland Electricity Board, in conjunction with the Royal Burgh of Kirkcaldy, has sent us a description of the new eight-storey all-electric block of flats now completed at Kirkcaldy. As briefly reported in our last issue, the flats were officially opened on 3rd June by Mr. Nixon Browne, Joint Parliamentary Under-Secretary of State for Scotland.

The building consists of an *in situ* reinforced concrete frame with 12in thick filler panels of no-fines concrete for the external walls and 8in panels for cross walls. Sound insulation is obtained by a floating concrete floor constructed on " Fibreglass " 1in thick compressed to ½in thick, laid on the precast concrete floor, the " Fibreglass " quilt being turned up at the edges. On top of the " Fibreglass " quilt a 2in screed is laid containing electrical floor heating. Finally the floor is finished with ⅛in thermoplastic tiles.

The electrical under-floor heating consists of aluminium cable housings of " U " section laid on top of the sound insulating blanket and bonded to expanded metal which acts as a heat diffuser and, incidentally, provides a reinforcement for the screed. At one end of the room a trough is formed to facilitate the drawing in of the heating cables and to accommodate the supply cables and jointing boxes. The troughs have removable covers which when in position provide a clear floor free from any obstruction and the only visible part of the heating apparatus is a thermostat mounted on a wall. It was not considered necessary to install electrical under-floor heating throughout the flat but only in the hall and living room; electric power points are, however, provided in all rooms. In addition, there is a 2 kW electric radiator in each living room.

Cooking and water heating are electric, the Corporation providing a 42 gal cistern type electric storage water heater, a two-plate electric cooker and an electric wash boiler.

Two circuits are provided throughout the building, one being " normal " and the other " off-peak " and these supply separate meters in each flat. The " off-peak " circuits supply the water heaters and the electric floor heating and are available during the night and for a short period in the middle of the day, electricity being charged for at a lower rate. The block contains 48 flats and supply is from an outdoor substation situated at the rear of the building and equipped with two 11,000/415/240 V transformers of 500 and 300 kVA capacity.

Power points are installed in each room on the ring main system; a socket outlet in each living room connects to a common aerial and amplifier at roof level for television, and the block has an eight-person electric passenger lift situated centrally.

It has been estimated that the average weekly costs throughout the year under normal conditions for a three-apartment flat will work out as follows:—

	s	d
Hot water	4	9
Floor heating	6	5
Extra electric radiator	2	10
Cooking	1	11
Lighting, etc.	1	9
Total	17	8

Electric floor heating being installed in the hall-way of one of the flats

When Government and local authority grants have been deducted from the estimated annual charges relative to the flats an estimated average economic subsidized rent of £65 per annum is obtained, although it has apparently been decided that the rent actually to be charged will be £33 per annum for the three-apartment flats and £30 per annum for the two-apartment flats. This sum seems somewhat out of proportion to the annual cost for fuel and power of about £46. No explanation is given of the source of the additional subsidy implied in the difference between £65 and £33.

Course on Radio-Isotopes

FOURTEEN specialists from seven countries have taken part in a course on " The Use of Radio-Isotopes in Engineering," arranged by the Atomic Energy Research Establishment, Harwell, and the British Council held in Harwell and London, from 13th to 24th June.

During the first week they attended lectures and demonstrations at the Isotope School, Harwell, on the elementary principles of radio-isotopes and their application to engineering. In the second week they saw the application of some of the laboratory techniques. Visits to equipment manufacturing companies were arranged so that those wishing to start work of their own could see the types of equipment available; these included visits to the Kodak School of Industrial Engineering and Radiography and the Kodak Works at Wealdstone, Solus-Schall, Ltd., 20th Century Electronics, Ltd., New Addington, and Ekco Electronics, Ltd., Southend-on-Sea. A demonstration of equipment arranged by Isotope Development, Ltd., was given at the British Council headquarters.

Members of the course came from Austria, Finland, Germany, Norway, the Philippine Islands, Portugal and Yugoslavia.

GENERATION AND DEVELOPMENT

Output and Sales in May

Last month's electricity output figures, although affected to some extent by the Whitsun holiday and the start of the rail strike, show an increase of 11·1 per cent over May, 1954 (see Table 1). At the end of May the total amount of plant installed in stations of the Central Electricity Board, North of Scotland Hydro-Electric Board and South of Scotland Electricity Board was 20,868 MW, an increase during the month of 32 MW. Additional plant installed in C.E.A. stations included a 360,000 lb/hr Babcock & Wilcox boiler at Uskmouth "A," a 30 MW English Electric set and 300,000 lb/hr Simon Carves boiler at Fleetwood, a 135,000 lb/hr Daniel Adamson boiler at Cowes and a 2 MW Mirrlees, Bickerton & Day diesel set at Kendal.

The Area Boards' sales in May are given in Table 2. The national figures show an increase over May, 1954, of 10·9 per cent, but when corrected for weather conditions and working days (28·27 against 28·80), the increase is 9·7 per cent.

Tummel and Breadalbane Amendments

The Secretary of State for Scotland has confirmed the North of Scotland Hydro-Electric Board's scheme for amending the Tummel-Garry project. The Board is required under this project to provide compensation water from the Errochty dam to maintain a minimum flow in the Errochty Water and the amendments will enable this water to be used to add 1¾ million kWh annually to the estimated production of 300 million kWh from the Tummel-Garry scheme. The estimated cost of the amending scheme is £102,000.

Amendments to the Breadalbane scheme in Perthshire have also been confirmed. It was originally intended that the water collected in the Killin catchment area on the south side of Glen Lochay and the north side of Glen Dochart should be led direct to the power station which is to be built in Glen Lochay, near Killin. This water is now to be collected at a higher level and led by a pipeline across Glen Lochay, near Kenknock, to the Lubreoch reservoir in Glen Lyon, which is the main storage reservoir of the scheme. The storage of that reservoir is being increased by raising the level of the spillway by 3ft. These alterations will provide greater control over the use of the water from the Killin catchment area and will increase the annual output of the scheme from 304 to 313 million kWh.

Lewis Hydro-Electric Scheme

A scheme prepared by the North of Scotland Hydro-Electric Board to supply 2 million kWh annually to the distribution system in Lewis has been confirmed by the Secretary of State. Under the scheme, Loch Grunavat will be formed into a reservoir by the construction of a weir at Loch na Ciste where the River Gisla flows out of the Loch. Further down the river a dam 300ft long and 27ft high will form a second reservoir by enlarging Loch More Coirgavat. Water from the River Todale catchment will also be diverted to flow into this reservoir. The scheme is estimated to cost £210,000.

At the suggestion of the Fisheries Committee the Board has agreed to make provision for screens which can, if necessary, be inserted to prevent fish having access to the turbines, but it has not been able to accept recommendations for giving compensation water on the River Todale, as the cost and the loss of output would in the Board's opinion make the scheme uneconomic. Three objections lodged against the scheme have all been withdrawn.

Castle Donington 132 kV Substation

The first section of the Castle Donington 132 kV grid substation of the Central Electricity Authority was recently energized by means of a new 5½ mile long overhead line looping into one of the existing Nottingham/Coventry feeders. This section of the substation has been commissioned to enable a works supply to be given preparatory to the commissioning of the new Castle Donington power station, in which the first 100,000 kW set is expected to begin operating towards the end of this year. In the immediate future, other 132 kV circuits radiating from this substation will be energized.

Castle Donington substation is of the low double-bus type, divided into three sections, the reserve bars being in the form of "horse shoes," with circuits back to back. This type of layout reduces the length from that of a normal double-busbar station by approximately 50 per cent, but even so the length of the station is 800ft.

TABLE 1.—ELECTRICITY GENERATED AND PLANT INSTALLED*

	Fuel consumed Thousand tons			kWh generated Millions			kWh sent out Millions	Installed capacity (m.c.r.) MW
	Coal	Coke and Breeze	Oil	Steam	Water power	Total		
Central Electricity Authority ...	3,009	70	17·5	5,680	8	5,696	5,341	19,017
North of Scotland H.E.B. ...	28	1	1·1	44	67	116	114	629
South of Scotland E.B.	202	8	0·1	378	24	402	380	1,222
Total for May, 1955	3,239	79	18·7	6,102	99	6,214†	5,835	20,868
Corres. total for May, 1954 ...	2,966	93	9·4	5,489	92	5,592	5,246	19,263
Inc. or dec., per cent	+9·2	−15·1	+98·9	+11·2	+7·6	+11·1	+11·2	+8·3
Total to date (5 months) 1955 ...	18,523	531	110·9	34,697	626	35,398	33,317	—
Total for corres. 5 months 1954...	16,882	512	65·4	30,927	617	31,608	29,743	—
Inc. or dec., per cent	+9·7	+3·7	+69·6	+12·2	+1·5	+12·0	+12·0	—

* Comprising all generating stations controlled by the Central Electricity Authority, the North of Scotland Hydro-Electric Board, and the South of Scotland Electricity Board.
† Including generation by other methods amounting to 13 million kWh.

TABLE 2.—ELECTRICITY SENT OUT BY AREA BOARDS FOR THEIR CONSUMERS

Area Board	Totals for May (million kWh)			Twelve Months Totals Ended 31st May (million kWh)		
	1954	1955	Inc. or Dec. %	1954	1955	Inc. or Dec. %
London	449·6	490·3	+ 9·1	5,811·6	6,330·9	+ 8·9
South Eastern	274·6	302·3	+10·1	3,470·4	3,815·5	+ 9·9
Southern	324·0	365·2	+12·7	4,065·6	4,598·3	+13·1
South Western	167·5	191·8	+14·5	2,008·0	2,381·5	+18·6
Eastern	447·5	498·7	+11·5	5,621·4	6,244·4	+11·1
East Midlands*	389·0	435·0	+11·8	4,781·1	5,367·3	+12·3
Midlands*	531·4	579·1	+ 9·0	6,440·2	7,153·6	+11·1
South Wales*	325·1	352·2	+ 8·3	3,708·1	4,125·8	+11·3
Merseyside and N. Wales* ...	304·8	344·6	+13·1	3,629·9	4,168·2	+14·8
Yorkshire*	514·2	570·1	+10·9	6,280·4	6,949·9	+10·7
North Eastern*	305·6	336·9	+10·2	3,746·1	4,085·1	+ 9·1
North Western*	571·6	614·2	+ 7·5	7,026·0	7,641·2	+ 8·8
Total all Area Boards	4,604·9	5,080·4	+10·3	56,588·8	62,861·7	+11·1
Direct Supplies by Central Authority	93·5	128·6	+37·5	1,049·0	1,507·2	+43·7
Grand Total	4,698·4	5,209·0	+10·9	57,637·8	64,368·9	+11·7
Mainly Industrial Areas*	2,941·7	3,232·1	+ 9·9	35,611·8	39,491·1	+10·9
Mainly Non-Industrial Areas ...	1,663·2	1,848·3	+11·1	20,977·0	23,370·6	+11·4

* Those in which industrial consumers took over 50% of the total sales in the preceding financial year.

The enclosure for the substation covers an area of 5½ acres and when complete there will be approximately 3¼ miles of overhead copper connections and busbars.

The substation will have 20 oil circuit-breakers controlling three generators, two 275/132 kV 120 MVA auto-transformers, two banks of two 132/3·3 kV 10 MVA station transformers, three bus-couplers, two bus-sections, six feeders and a reactor. There are skeleton bays for a further ten circuits as required.

To avoid the reserve bars of the centre section having to cross the main busbar with overhead connections, a short length of 132 kV 0·6 sq in cable, two circuits per phase, has been incorporated in the bars. The first and third sections of the bars are coupled by means of a 90 MVA reactor which has been installed to limit the fault level to the rupturing capacity of the 3,500 MVA bulk oil circuit-breakers which are of B.T.H. manufacture. These circuit-breakers are pneumatically closed and spring opened.

New Midlands Substation

A new 132 kV grid substation, planned to meet the rapidly growing demand for electricity in the Midlands Electricity Board's Stroud District, was declared open by the chairman of the Board, Mr. W. S. Lewis, at Ryeford, near Stroud, Glos, on 14th June. Among those present were Mr. A. C. Thirtle, controller of the C.E.A. South Western Division (the electricity supplied through the new substation is generated in the S.W. Division), Mr. S. Raybould, recently appointed manager of the Midlands Electricity Board's Central Gloucestershire Sub-Area, and Mr. R. C. Wright, manager of the Stroud District. The inauguration and inspection of the new substation, built at a cost of £120,000, was followed by a visit to the Board's new 33 kV distribution substation at Camp, which will receive its supply from Ryeford.

The demand for electricity in the Stroud District is growing at the rate of about 19 per cent annually. When the District was formed in 1948 there were about 10,000 consumers and sales amounted to 26 million kWh per annum. To-day the District has upwards of 16,000 consumers and sales now exceed 65 million kWh a year. The maximum demand on the distribution system has risen in seven years from 8,300 kVA to nearly 20,000 kVA. In the same period the number of farms on supply has been trebled.

River Mourne Scheme

A hydro-electric scheme costing £3,750,000 for developing the resources of the River Mourne and its tributaries, now used on a small scale for the generation of electricity in a private station, is announced by the Northern Ireland Ministry of Commerce. It provides for the construction of (a) a dam and 18,000 kW generating station near Mulvin and (b) a dam with a 9,500 kW station near Sion Mills. The scheme also provides for the interconnection of the stations and for their connection with existing power sources.

The combined stations are expected to produce about 78 million kWh annually—about 9 per cent of the total quantity sold in Northern Ireland in 1954. The Ministry is advised that, after providing for interest and sinking fund, the annual cost would be some £100,000 less than the cost of equivalent production in a modern coal-fired station at the present cost of coal and that the saving of coal would be some 47,000 tons a year.

One purpose of the scheme is to extend the main transmission system from its terminus at Omagh to the proposed stations. At present the principal generating stations are, for economic and practical reasons, all situated on the east coast (at Belfast and Ballylumford) and the provision of generating stations which would add their output to the system at the point now proposed would increase the efficiency of the transmission system in the northern and western areas.

Electricity on Exmoor

To-day (Friday) at the Memorial Hall, Exford, Mr. H. L. d'A. Hopkinson, M.P. for Taunton, is to switch on an electricity supply to the rural communities at Exford and Withypool, on Exmoor. This marks an important occasion in the rural electrification plans of the South Western Electricity Board, which is now tackling the really difficult and isolated parts of the area. Excellent support for the Exford/Withypool scheme has been received from farmers, villagers and local tradesmen, nearly 90 per cent of the possible participants having agreed to take a supply at the outset. This has been made possible by the Board's rural development contributions scheme, a system of standard connection charges designed to bring electricity within the means of everyone in rural areas. To provide supplies to 26 farms and 144 other rural premises the Board has had to construct some 15 miles of mains and install 24 substations at a cost of over £27,000. A special programme on the supply to these Exmoor communities is to be broadcast in the B.B.C.'s West of England Home Service on Monday, 27th June, at 6.30 p.m.

Cookers in Council Houses

Redditch U.D.C. has appointed a sub-committee to examine the question of tenants being given a choice of gas or electric cookers. The surveyor reported that perfectly good cookers, costing about £20, provided by the Council were being dumped outside and left to rust when incoming tenants wanted to cook by alternative means.

Stage and Auditorium Lighting

A series of conferences and demonstrations arranged by the South Wales Electricity Board and held last week in the Demonstration Theatre at The Hayes, Cardiff offices, was most successful, with capacity audiences. The purpose was to demonstrate the latest system of stage and coloured decorative lighting, of which a permanent installation by Thorn Electrical Industries, Ltd., has just been completed, with provision for dimming and colour change by electronic control.

Mr. A. J. Dalton, the Board's senior assistant chief commercial officer, in his talk, "Rivalling the Rainbow," explained how a most complicated system of control had been simplified by the use of electronic equipment which, besides operating the lighting in the auditorium and on the stage, would be used for the control of dimming and colour change in The Hayes showroom windows, and probably in the showroom also. Mr. Dalton went on to demonstrate the lighting by means of a small demonstrator's control panel on the stage, which will be used by the Board's demonstrators for the control of lighting during cookery and other demonstrations.

Afterwards the control was taken over by Mr. C. Passmore, Thorn's theatre lighting engineer, from the main "perch" type control board, having a switch panel of very much smaller dimensions than has been necessary with older theatre installations. The audience were able to ask questions of the technical staff, inspect the equipment and operate the lighting.

Mr. A. J. Dalton, senior assistant chief commercial officer of the South Wales Electricity Board, showing the demonstrator's control panel to Mr. R. L. Booth, South Wales Sectional Board chairman of the E.C.A.

Financial Section

STOCKS and SHARES

THE tear-away rise of prices in the industrial market of the Stock Exchange during the first half of June showed some signs of deceleration in the second part. Profit-taking, and a sense that the pace had been too hot to last, caused in some cases a halt, and in others a moderate reaction. On the average, however, the tendency has still been decidedly upwards, and at several points the advance has been aggressively maintained. In the van, once again, have been the shares having atomic power and electronic associations. Among the constant leaders in this category the shares of C. A. Parsons and A. Reyrolle jumped further to the neighbourhood of £5 and £6 respectively. On the eve of the General Election, less than a month ago, these quotations were about £4 and £5¼.

Also in the "atomic power" group, A.E.I. and Babcocks each advanced by a further 5s. Lancashire Dynamos have sprung into favour lately, putting on more than 10s in the space of a fortnight. Advances of half-a-crown or so were recorded in Automatic Telephone, Electric Construction, British Thermostat, Clarke Chapman and Walsall Conduits. De La Rue were strong in advance of the dividend declaration, and among other improvements to attract attention were those in Marryat & Scott, Thorn Electrical, Wolf Electric, Revo and Veritys.

Ekco Dividend

Another large advance in the progress of the E. K. Cole group is disclosed in the preliminary statement of results for the year to last March. Since last year the ordinary capital has been increased by both scrip and cash issues of shares. On the present capital of £838,000 the company is bringing the total distribution up to 17½ per cent. In terms of money, this represents an increase in the distribution from £44,400 to £82,800 net, which is still well under a third of the disposable surplus. The latter, at £305,000, expanded by nearly 70 per cent over the previous year's results. The market had been discounting excellent figures, and, in the event, the 5s shares were dealt in about 1s below the official list price of 24s. A yield of under 4 per cent reflects the confidence of investment in the future of the radio and electronics field.

Ultra Electric Issues

Shareholders of Ultra Electric (Holdings) are now being offered, in respect of every six 5s units, one new "A" share free, through a capitalization of reserves, and another share for cash at 12s 6d by way of "rights." Dealings have been in progress at around 17s 6d for the former, and at a premium of 5s 6d for the "rights" shares. (Since the old capital is divided between ordinary and "A" ordinary shares, there are, in fact, four separate quotations at the moment for the various issues.) The full annual report,

The Week's Price Changes

Company or Board	Nom. Value	Middle price 20th June	Week's Rise or Fall	Dividend Previous	Dividend Last	Yield % £ s d	1955 Highest	1955 Lowest
Gilt-edged Stocks								
Brit. Elec. 1968/73	100	84½		3	3	3 11 0	94¾	84½
Brit. Elec. 1974/77	100	84½		3	3	3 11 0	93¾	84½
Brit. Elec. 1976/79	100	88½		3½	3½	3 19 0	98¾	87½
Brit. Elec. 1974/79	100	100½		4¼	4¼	4 4 6	109	99½
Overseas Electric Supply								
Calcutta Elec.	£1	21/6		6†	6†	5 11 8†	22/6	20/9
East African Power	£1	23/-		7	7	6 1 9	23/3	19/9
Nigerian Elec.	£1	23/-		10	10	8 14 0	27/-	22/6
Palestine Elec. "A"	£1	21/-		Nil	Nil	—	22/9	21/-
Perak Hydro-Elec.	£1	18/-		6	10	11 2 3	21/-	17/9
Equipment and Manufacturing								
Aberdare Cables	5/-	14/6		12½	17½	6 0 9	14/6	11/-
Aerialite	1/-	5/9		88½	88½	—	6/7	5/3
Allen, W. H.	£1	80/-		20	20	5 0 0	81/6	77/-
Aron Elec. Ord.	£1	61/3	−2/6	20	15	4 18 0	63/9	55/6
Assoc. Elec. Ord.	£1	86/3	+5/-	11¼	14	3 5 0	86/3	65/3
Automatic Tel. & El.	£1	75/9	+2/6	15	15	3 19 0	79/6	69/-
Babcock & Wilcox	£1	88/6	+5/-	12*	15	3 7 9	88/6	68/6
Baldwin, H. J.	2/-	4/9		20	20	8 8 6	5/4	4/4
Bakelite	10/-	32/6	+6d	12½	16	4 18 6	32/6	27/-
British Aluminium	£1	51/6	+6d	10	12	4 13 3	52/-	35/3
B.I. Callender's	£1	53/-	+6d	10	10	3 15 6	55/3	44/9
B.I. Callender's 6% Pref.	£1	24/-		6	6	5 0 0	26/6	24/-
British Thermostat	5/-	33/9	+2/6	27½	27½*	4 1 6	33/9	22/6
British Vac. Cleaner	5/-	8/6	+6d	25	30	—	9/-	7/-
Brook Motors	10/-	41/3		20	20*	—	42/9	39/9
Brush Ord.	5/-	9/-	+6d	6	10	5 11 0	9/6	7/7
Bulgin, A. F.	1/-	7/-	+3d	30	45	6 8 6	7/-	4/-
Burco	5/-	18/9		35	25*	6 13 3	23/-	18/9
Chloride El. Storage "A"	£1	76/3	+1/3	12½	17½	4 11 9	76/3	58/6
Clarke Chapman	£1	102/6	+2/6	20	20*	3 18 1	102/6	68/9
Cole, E. K.	5/-	24/-	+6d	27½	17½*	3 13 0	24/6	18/3
Cossor, A. C.	5/-	10/3		10	10	4 17 6	11/3	8/9
Crabtree	10/-	31/3		17½	20	6 8 0	34/6	29/3
Crompton Parkinson Ord.	5/-	19/-	+3d	20	20	—	19/9	16/-
De La Rue	5/-	26/-	+1/3	Nil	20	3 17 0	26/-	18/9
Decca	4/-	42/9	−9d	35	56¼*	—	45/6	31/-
Desoutter	5/-	29/6		20	25	4 4 9	29/6	25/6
Dewhurst	2/-	9/9	−3d	19	24	4 18 3	10/-	7/3
Dictograph Tel.	2/-	7/3		20	20	5 10 3	7/6	6/6
Dubilier Condenser	1/-	5/3		25	25	—	5/7	3/10
E.M.I.	10/-	31/9	+3d	8	10	3 3 0	37/-	25/3
Electrical Components	5/-	17/-	+1/3	20	20	5 17 8	17/6	15/3
Elec. Construction	£1	41/3	+2/6	15	15	3 12 9*	41/3	31/6
Enfield Cable Ord.	£1	20/-	−1/3	Nil	Nil	Nil	25/3	20/-
English Electric	£1	75/-	+1/3	10	12½	3 6 9	76/3	54/3
English Electric 3½% Pref.	£1	15/6		3¾	3¾	4 16 9	16/9	14/9
Ericsson Tel.	5/-	45/-	+1/6	25†	20†*	2 4 6†	45/-	29/-
Ever Ready	5/-	32/9	−9d	40	35*	5 6 9	33/6	22/3
Falk Stadelmann	£1	50/9	+9d	15	15	5 18 3	50/6	43/9
G.E.C. Ord.	£1	65/-		11¼	12½	3 17 0	66/3	51/3
G.E.C. 6½% Pref.	£1	26/3		6½	6½	4 19 0	28/4	23/6
General Cables	5/-	15/9		30	30	9 10 6	17/-	15/9
Greenwood & Batley	£1	55/-		17½	17½	6 7 3	57/-	54/6
Hackbridge Cable	5/-	17/3		20	20	5 16 0	17/9	14/-
Hackbridge & Hewittic	5/-	28/9		20	25	4 7 0	28/9	23/9
Hall Tel. Acc.	10/-	16/9	+9d	10	10	5 19 6	16/9	11/-
Heatrae	2/-	5/3		12½	15	5 14 3	5/9	4/3
Henley's	10/-	20/6	−3d	10½	10½	5 2 6	20/9	17/-
Holophane	5/-	17/6		20	25	7 2 9	19/9	16/-

* After scrip issue. † Free of income tax.

The above quotations are based upon middle prices in the Stock Exchange Daily Official List.

distributed at the same time as this operation, stimulated the demand for the shares. Dealings were active, especially in the "rights" shares, which are at present transferable in allotment-letter form and free of stamp duty.

As already known from the preliminary statement, Ultra Electric's earnings for the year ended in March rose by £66,000 to £279,000 and the ordinary dividend is being maintained at 15 per cent on increased capital.

in Electrical Investments

Company or Board	Nom. Value	Middle price 20th June	Week's Rise or Fall	Dividend Previous	Dividend Last	Yield %	1955 Highest	1955 Lowest
Equipment and Manufacturing—continued.						£ s d		
Hoover	5/-	49/-		45	70	7 2 9	52/6	40/-
I.C.I.	£1	55/9	+2/9	15	10°	3 11 9	56/6	38/3
Intl. Combustion	5/-	21/6	+9d	20	25	—	21/6	16/3
Johnson & Phillips	£1	45/-	+6d	15	15	6 13 4	52/6	45/-
Lancashire Dynamo	£1	53/9	+7/6	14	15	—	53/9	37/3
Laurence, Scott	5/-	17/9	+1/-	20	12½°	3 10 6	17/9	14/6
Lister, R. A.	£1	34/6	+6d	12	9·3°	5 7 9	38/3	30/6
London Elec. Wire	£1	58/3	−6d	10	12½	4 6 2	61/-	50/6
Lucas, J.	£1	50/-	+1/3	10·8	7½°	3 0 0	50/6	41/6
Marryat & Scott	2/-	12/6	+1/-	22½	25	4 0 0	12/6	9/6
Mather & Platt	£1	67/6	+1/-	15	13·4°	3 19 6	67/6	48/-
Metal Industries	£1	35/6	−6d	12	9	5 1 6	38/-	30/-
Midland Elec. Mfg.	£1	51/3	+1/3	15	10°	3 18 0	51/3	44/-
Morphy-Richards	4/-	33/9x.r.		40	35°	4 3 0	35/-	27/-
Murex	£1	53/-		15	15	5 13 3	57/-	49/3
Newman Ind.	2/-	2/9		10	10	7 5 6	3/6	2/4
Oldham & Son	1/-	4/-		17½	17½	4 7 6	4/-	2/10
Parnall (Yate)	5/-	11/-	−6d	8	14	6 7 3	13/2	7/3
Parsons, C. A.	£1	100/-	+10/-	7½	10	2 0 0	100/-	56/-
Plessey	10/-	77/6		30	20°	2 11 6	77/6	57/6
Pye Deferred	5/-	37/6	+9d	20	20°	2 13 4	40/6	28/6
Revo	10/-	14/-	+1/-	27½	9°	6 8 6	15/-	12/6
Reyrolle	£1	120/-	+5/-	13¾	15	2 10 0	115/-	89/-
Rheostatic	4/-	13/3	+9d	20	22½	—	13/3	9/3
Richardsons Westgarth	5/-	16/9	+6d	15	15°	4 9 7	16/9	11/-
Scottish Cables	4/-	20/3		27½	27½	5 8 6	22/6	19/3
Smith (England), S.	4/-	19/-	+6d	15	17½	3 13 9	20/-	15/-
Southern Areas	£1	31/-		7½	10	6 9 0	34/9	27/6
Strand Elec.	5/-	10/3	+3d	17½	17½	8 10 9	10/3	8/6
Sturtevant	5/-	35/-	−9d	18·9	14·4†°	2 1 3†	35/9	21/-
Sun. Elec.	£1	33/9		15	15	8 17 9	34/6	33/9
Switchgear & Cowans	5/-	15/-		10	20	6 13 4	15/6	11/-
Taylor Tunnicliff	5/-	14/3	+6d	12½	15	5 5 3	14/3	11/3
T.C.C.	10/-	47/6		30	25°	5 5 3	48/-	41/-
T.C. & M.	£1	37/6	+6d	8½	8½	4 10 9	40/9	35/-
Telephone Mfg.	5/-	10/6	+3d	10	10	4 15 3	10/6	9/3
Thorn Elec.	5/-	26/-	+1/6	12½	20	1 18 6°	26/-	13/9
Thornycroft	£1	43/9	+1/3	15	15	—	44/-	34/6
Tube Investments	£1	95/-	+3/9	15	17½	3 13 8	95/-	72/6
Vactric	5/-	18/9		10	15°	4 0 0	18/9	12/-
Veritys	5/-	8/9	+1/9	12½	12½	7 2 9	9/3	7/-
Walsall Conduits	4/-	53/9	+2/6	70	70	5 4 0	55/-	50/-
Ward & Goldstone	5/-	45/-	+1/3	45	50	—	45/-	37/6
Watford	2/-	8/-		22½	25	6 5 0	8/-	6/3
Westinghouse Brake	£1	106/3	+1/3	16	18	3 7 9	106/3	82/-
West, Allen	5/-	16/6		17½	15°	4 11 0	16/6	8/-
Wolf Electric	5/-	20/6	+1/-	17½	20	4 17 6	20/6	16/1
Trusts, Transport and Communications								
Anglo-Am Tel.:								
A. Ord.	100	75½		6	6	7 19 0	88	75½
Ord.	100	50		3¾	3¾	7 17 6	54½	50/-
Anglo-Portuguese	£1	25/-		8	8	6 8 0	25/-	21/-
Brit. Elec. Traction:								
Def. Ord.	5/-	24/-		50	22½°	4 13 9	24/3	19/6
Cable & Wireless:								
Ord.	£1	51/-	−3d	9	10	3 18 3	51/3	39/6
4% Loan	100	97½		4	4	4 2 0	100/-	92/-
Calcutta Trams	£1	22/6		2½†	6†	5 6 8†	25/-	20/-
Cape Elec. Trams	£1	18/-		5½	7½	8 6 8	18/-	16/6
Marconi Marine	£1	40/-	+1/3	10	10	5 0 0	40/-	33/-
Oriental Tel. Ord.	£1	101/3		16	16	—	102/6	96/6
Telephone Props.	£1	88/9		—	20	4 10 3	90/6	80/6
Telephone Rentals	5/-	13/-	+6d	10	12½	4 16 3	13/-	9/6

(The latest issues of shares do not qualify for this payment.) With the company's manufacturing capacity loaded to the full, the fresh capital is being raised to finance the erection of a new factory. Production and sales for the first part of the current year are said in the report to show a healthy increase, indicating another year's successful trading. Assuming the maintenance of the present rate of dividend, the shares offer a prospective yield of a little over 4 per cent.

Company Results

Net profits of Aron Electricity Meter, after a smaller tax charge this time, are reported at £66,300, which is about a quarter higher than the previous figure. The dividend is again to be 15 per cent, the rate paid for most of the twelve preceding years. On the figures in the preliminary statement, it is covered fully five times over by the distributable surplus. The trading profit, before tax, shows some reduction, which is in line with the advices given by the chairman at last year's annual meeting. The £1 shares were subsequently quoted a little lower at 61s 3d. Aiton & Co. 10s shares were marked up 5s to 40s on news of the increase in the dividend from 17½ to 20 per cent.

Morphy-Richards Issue

Morphy-Richards new 4s shares, issued in connection with the company's entry into the refrigerator field, have been changing hands at a premium of 7s 3d on the price of 27s at which they are offered to existing stockholders. They will rank for the final dividend on account of the year ending this month, for which an interim of 20 per cent has already been paid. A statement accompanying the issue reports a 50 per cent increase in the company's sales, by value and volume, for the first ten months of this period. Issued before the end of the railway strike, it adds that in the absence of that occurrence, the board had been prepared to recommend a final dividend of at least 25 per cent. On the basis that a distribution at that rate does in fact materialize, there is a prospective yield of 5¼ per cent on the shares.

B.E.T. Improvement

Having forecast, at the time of last year's capitalization issue, dividends totalling not less than 20 per cent, British Election Traction now declare a final dividend making 22½ per cent for the latest year. It represents, in effect, an improvement of about 6 per cent on the previous payment, and comes from earnings which have risen 16 per cent to close on £1½ million net. Apparently expectations have been pitched too high, for the price of the 5s deferred shares turned easier in the market to 23s (the official quotation remained at 24s). The 5s shares of Broadcast Relay Service, of which B.E.T. has a large holding, hardened to 46s 6d on publication of the results.

REPORTS and DIVIDENDS

Venner, Ltd.—The results for 1954 were mentioned in last week's issue. In the statement which he is to make at the annual meeting on 12th July, the chairman, Mr. A. A. Rowse, C.B.E., says that during the year an unsecured loan of £200,000 at 5¼ per cent was arranged. There is no bank overdraft but substantial facilities are available and current cash resources are adequate for present operations. Sales increases were recorded in all departments. Export sales were, in the main, confined to the time switch and instrument division and accounted for 25 per cent of the output. The success of the company's parking meters overseas reinforces the view that there is a useful market at home when legislative action is complete and the system is appreciated by the public. The battery business continues to make reassuring progress on a profitable basis and inquiries for increased quantities of electronic marker buoys are in hand. In the field of precision instruments the company's efforts in regard to special aircraft equipment have been successful. The order position is satisfactory and in the absence of factors outside the company's control a satisfactory year is expected.

Ultra Electric (Holdings), Ltd., reports group trading profits for the year to 31st March last of £279,314, as compared with £213,055 for 1953-54. Taxation requires £135,757. It is proposed to pay a dividend for the year of 15 per cent. This is at the same rate as for the previous year, but is payable on capital increased by a scrip issue and a "rights" issue.

In his statement which accompanies the report and accounts, Mr. E. E. Rosen (chairman and managing director) says that there was a noticeable recession in general demand for radio and television sets in the spring and early summer of the year under review, from which, however, there was a marked recovery in July; from that point onwards the demand for their products continued at a high level. Sales in the current financial year already have been substantially better than a year ago. The branch dealing with special products which embraces the development and manufacture of electronic and other equipment, has made a valuable contribution to the turnover. Development activity has also been intense in a number of other fields, some associated with defence and others with civil application. In referring to the raising of new capital (*Electrical Review*, 10th June, p. 1051), Mr. Rosen says that the proceeds will be used to finance the erection of a new factory at Gosport.

At an extraordinary meeting held on 14th June the resolution to capitalize £90,000 standing to the credit of the share premium account, to be applied in paying up in full 360,000 "A" ordinary shares to be distributed in the proportion of one new "A" ordinary share for every 30s nominal amount of share capital held, was passed.

Scottish Cables, Ltd.—Details of the accounts were given in our issue of 10th June. In his circulated statement Mr. William Fraser (chairman) says that the company has again been working to full capacity and the volume of production achieved in 1954-55 was a record. Competition both at home and abroad, however, was keen, resulting in a lowering of profit margins and the trading profit showed a slight reduction on 1953-54 (eleven months). In the export market the company more than held its own against very acute competition and increased its turnover. The associated company, Scottish Cables (South Africa), Ltd., had another successful year though trading conditions were not so favourable as in the previous year.

Good progress has been made with the extensions and developments referred to last year and the additional factory space is already being fully utilized. New plastic extruding machines incorporating many special features have been installed and will facilitate the production of rubber insulated cables on the most efficient and economic basis. An extension of the laboratories is planned to ensure adequate facilities for research and development and the company will also be proceeding with an extension of its offices so that staff at present in temporary accommodation can be transferred to one central administrative office. To relieve congestion and provide additional floor space for new projects it will also be necessary to make further extensions to factory buildings.

The directors have decided to market an extensive range of p.i.l.c. cables with aluminium conductors, which will be available as an alternative to the copper type.

John Thompson, Ltd.—This company's accounts for 1954 were reviewed in our issue of 3rd June. In the statement to be presented by the chairman (Mr. E. W. Thompson) at the annual meeting on 20th July reference is made to the possibility of increased capital expenditure in the next two or three years, necessitated by rising demands and important developments. Mr. Thompson deals with the activities of the subsidiary companies at home and overseas and says that several of the companies of the group have completed important orders for the Atomic Energy Authority. He also mentions their collaboration with the A.E.I. Group in the development of atomic power stations.

In the face of keener competition and rising costs output so far this year has substantially increased. At present the value of orders on hand is about £38 million. Export orders have been well maintained.

Ferranti, Ltd., report a group profit for the year ended 31st March last of £576,605, as compared with £546,863 for the preceding nine months. The profit is struck after providing £638,000 for taxation, and after taking into account the net loss of £143,433 incurred by the subsidiaries. The results of the latter were converted as before at $2·80 to the £1. The respective profits and losses of the subsidiaries have been carried forward in their books. General reserve receives £550,000 and £42,000, tax relief on investment allowances, is placed to capital reserve. Unrequired tax of £700,000 has been transferred to general reserve which now stands at £2,300,000. The ordinary dividend for the year is 6 per cent, the same as for the preceding period of nine months. The consolidated balance carried forward is £671,755 (against £784,030 brought in).

Ruston & Hornsby, Ltd.—A group profit of £2,776,794 is reported for the year to 31st March last, as compared with £2,820,730 for 1953-54. After meeting all charges, including £1,027,357 for taxation, the net balance is £1,060,753 (against £1,062,703). Of this £365,071 is retained in subsidiaries, and the net profit of Ruston & Hornsby is £695,682 (£739,277). General reserve receives £382,822 and the ordinary dividend for the year is unchanged at 12½ per cent. The balance carried forward is £260,181 (against £255,227 brought in).

Subject to the consent of the Treasury, it is proposed to capitalize £2,050,000 of reserves by way of a one-for-two scrip issue in ordinary shares.

Broadcast Relay Service, Ltd., is to pay a final dividend of 12½ per cent, making 22½ per cent tax free on capital increased last July by a one-for-ten rights issue. The final dividend last year was 12 per cent, making 22 per cent, tax free. In addition a 100 per cent free scrip issue is proposed. Group trading profits for the year to 31st March last increased from £2,431,064 to £2,928,480, and the net balance attributable to the company, after tax, is £612,331 (£546,184), after charging £1,200,000 (£800,000) to general contingencies reserve.

The British Electric Traction Co., Ltd.—It is proposed to pay a final dividend of 15 per cent, making 22½ per cent on £7,470,768 of deferred and "A" deferred stocks for the year ended 31st March last. A total of 50 per cent was paid for the previous year on £2,372,256 stocks before a scrip issue of two-for-one. The aggregate group profit is £2,995,174, as compared with £2,663,426, and

(*Continued on page* 1155)

Reports and Dividends (*continued*)

after deducting £1,328,772 for taxation, the group net balance is £1,666,402 (against £1,405,877), of which £1,466,585 is attributable to the parent company.

E. K. Cole, Ltd.—After providing for depreciation and £402,750 for taxation, the group net profit for the year to 31st March last is £304,779, as compared with £181,332 for the previous year. It is proposed to pay a final dividend of 10 per cent, making 17½ per cent for the year on capital of £838,150. For the previous year the total distribution was 27½ per cent on capital of £294,075.

Richardsons Westgarth & Co., Ltd.—The trading profit for the year ended 31st March last is £1,004,304, as compared with £1,013,346 for 1953-54. Taxation requires £557,965, and the net profit is £446,339 (against £363,022). It is proposed to pay a dividend of 16¾ per cent for the year (against 15 per cent).

Aron Electricity Meter, Ltd.—The profit for the year to 31st March last, before taxation, is £119,803, as compared with £165,722 for the preceding year. Taxation absorbs £53,499 and the net balance is £66,304 (against £52,765), to which is added unrequired tax of £8,847. Reserves receive £60,000 and the dividend for the year is maintained at 15 per cent. The balance carried forward is £59,795 (against £57,748 brought in).

The Automatic Telephone & Electric Co., Ltd.—At the separate class meeting of holders of the "B" deferred stock and at the subsequent extraordinary meeting held on 15th June, resolutions increasing the capital of the company to £5,000,000 by the creation of 1,440,000 additional ordinary shares of £1 each were duly passed.

Burco Dean, Ltd., which was formed earlier this year to merge the businesses of Burco, Ltd., and W. H. Dean & Son, Ltd., has declared an interim dividend of 7½ per cent.

J. & E. Hall, Ltd., have announced an interim dividend of 2½ per cent (unchanged) on capital increased by a scrip issue.

Liquidation

Horace Guest, Ltd., electrical engineers.—First and final dividend of 3d in the £, payable at the office of the Official Receiver and Liquidator, Inveresk House, 346, Strand, London, W.C.2.

Bankruptcy

A. Fielder, 314, Shortheath Road, Erdington, Birmingham, and 4, Cooksey Lane, Erdington, Birmingham, trading as A. Fielder & Co., radio and electrical retailers.—Last day for receiving proofs for dividend 2nd July. Trustee, Mr. R. K. Clark, Somerset House, 37, Temple Street, Birmingham, 2, Official Receiver.

IN THE COURTS

Responsibility for Electrical Accident

The Magistrate at Bow Street (Mr. R. H. Blundell) had to decide on Friday whether the building contractors, George Wimpey & Co., Ltd., of Hammersmith Grove, Hammersmith, or their nominated electrical contractors, the Berkeley Engineering Co., Ltd., Westminster, S.W.1, were responsible for a happening which resulted in the death of a man.

Wimpeys were summoned for, "being persons undertaking building operations within the meaning of the Factory Act, contravening Reg. 2 by not having the metal cap of a screw cap lamp covered with insulating material and protected where necessary to prevent danger, and so placed and safeguarded as was reasonably practicable to prevent danger, as a result of which contravention Henry Martin suffered shock and died." There was a summons against Berkeley Engineering Co., Ltd., as the actual offenders.

Miss P. M. Vickers, prosecuting, said that Wimpeys were building at Haymarket House, Haymarket, and the Berkeley Engineering Co. were the nominated electrical contractors. John Martin, one of Wimpeys' employees, was at work in a lift shaft, "chipping" the inside of a doorway. A bricklayer working above heard Martin scream, ran down, and found him crouched on the top of the lift, clutching an electric lamp. The man tried to pull Martin away but received a shock. Finally, the power was cut off, and Martin was taken to hospital, but died on the way.

Miss Vickers explained that rubber cable, with lamps at intervals, was used for lighting the lift shaft. The bulbs were of the screw cap type, and it was found that part of the screw cap of the bulb Martin was holding was uncovered, that the holder, a pin type, had been put on the wrong way round according to polarity, and that the unprotected part of the bulb screw was acting as a conductor.

It might be suggested, said Miss Vickers, that rubber rings were given out with the lamps, but there was always the danger that someone would remove the lamp and ring, and that someone would put in another lamp without a ring. That is what seemed to have happened in this case. The only safe way was to use a holder with a "protecting skirt." The lamp was not safely out of reach. It was draped over the lift door, and was hanging on a piece of wire.

A number of witnesses were called. One, a bricklayer employed by Wimpeys, said he had often got screw fitting bulbs from Wimpeys' store at Haymarket, but was never given any special instructions about fitting them. The day before the accident there was no lamp in the socket on the floor where Martin was working, and he sent Martin for one. Later all the lights failed, but went on again after he had reported it.

Patrick Caulkett, an electrician on the Haymarket building, said the day before the accident he saw a lamp holder fitted on the wrong polarity. Replying to Mr. John May, for Wimpeys, he agreed that he ought to have put it round the right way but did not do so. There might have been a lot wrong, he said, and if he did one he might have had to do the lot. Whenever he drew bulbs from Wimpeys he always got rubber rings and fitted them with the lamps.

Mr. A. S. Carr, electrical inspector of factories, said that rubber rings were fitted to lamps to keep them watertight. The only safe way was to use holders with "skirts." The lamp which Martin had held had the bulb screw in contact with the live core of the cable.

Witnesses called included two storekeepers who said they had bulbs in store but no rubber rings.

Joseph Watson, who had been general foreman at the time of the accident, said the initial temporary electrical work was done by another firm before the Berkeley Company commenced work. Alfred John Tuck, chief supervising engineer to Berkeleys, said his firm had the contract for the wiring. They did other work, on day-work rates, if instructed, but this was charged up separately. Before the accident no one was employed specially on maintenance work, but the day after the accident Wimpeys instructed him to put a man and mate on maintenance as a whole-time job.

Mr. Michael Hoare, for Berkeleys, submitted he had no case to answer. The accident happened because someone took a bulb with a rubber ring out and someone else put one in without a ring. The holders had been used by Wimpeys before the Berkeley Company began work there. The latter company had the installation contract, and were responsible under that contract, but there was nothing in the contract about maintenance, and this was paid for separately.

Mr. May submitted that Wimpeys had shown every diligence and that their nominated contractors were responsible.

The Magistrate held that the Berkeley Engineering Co. had committed no offence at all, and that the case against Wimpeys was proved. Wimpeys were fined £10 and ordered to pay ten guineas costs. The summons against the Berkeley Company was dismissed, and Wimpeys were ordered to pay them ten guineas costs.

NEW PATENTS

Electrical Specifications Recently Published

The numbers under which the specifications will be printed and abridged are given in parentheses. Copies of any specification (3s 0d each including postage) will be obtainable after 27th July from the Patent Office, 25, Southampton Buildings, London, W.C.2.

1949

15848, 16588, 16589 and 16591. National Research Development Corporation.—Electronic digital computing devices. 5th June, 1950. (734071/3/4/5.)

1951

7080. British Thomson-Houston Co., Ltd.—Apparatus for shaping filament mounts. 27th March, 1951. (734263.)

13285. Bellon, F. B.—Indicating apparatus, direction transmitters and in particular magnetic compasses and their compensation. 5th June, 1951. (734076.)

19091. Venter, J. A.—Earthing connections for electrical conduits. 27th August, 1953. (734188.)

1952

1045. Johnson & Phillips, Ltd.—Methods of and apparatus for laying submarine cables. 13th January, 1953. Cognate application 16879, 4th July, 1952. (734082.)

5876. Philips Electrical Industries, Ltd.—Transformers. 6th March, 1952. (734273.)

9307. Standard Telephones & Cables, Ltd.—Electric signal switching circuits and cold cathode gas-filled discharge tubes therefor. 16th March, 1953. (734345.)

12323. Tannoy, Ltd., and Crowhurst, N. H.—Electrical crossover filters. 11th November, 1953. (734346.)

13968. Metropolitan-Vickers Electrical Co., Ltd.—Liquid immersed electric circuit-breakers. 17th April, 1953. (734088.)

14675. Standard Telephones & Cables, Ltd.—Indirectly heated cathode. 11th June, 1952. (734196.)

16251. Standard Telephones & Cables, Ltd.—Cases for electrical capacitors. 27th June, 1952. (734198.)

18744. Cinema-Television, Ltd.—Circuit arrangements for use with electron-discharge devices. 22nd July, 1953. (734199.)

20095. Eckington, F. J.—Snow clearing device for overhead electric lines or cables. 9th November, 1953. (734092.)

20139. Nyrop, J. E.—Methods and apparatus for transforming thermic energy of high temperature into electrical energy. 11th November, 1953. (734201.)

20490. General Electric Co., Ltd., Jackson, K., and Knott, R. D.—Cold cathode electric discharge devices. 14th August, 1953. (734288.)

21570. Carpenter, R. E. H.—Suspensions of electromagnetic instruments. 13th August, 1953. (734352.)

21763. Philips Electrical Industries, Ltd.—Circuits for gas filled and/or vapour filled electric discharge tubes. 29th August, 1952. (734289.)

22381. English Electric Co., Ltd.—Fluid couplings. 21st August, 1953. (734202.)

22951. Philips Electrical Industries, Ltd.—Circuits for gas filled and/or vapour filled electric discharge tubes. 12th September, 1952. (734293.)

24961. English Electric Co., Ltd.—Electric transformers. 2nd October, 1953. (734205.)

26627. Clang, Ltd., Austen, H. E., and Harwood, C. D.—Electrical fused plugs. 23rd October, 1953. Cognate application, 12470, 5th May, 1953. (734206.)

26978. Lodge-Cottrell, Ltd., and Thorp, H. W.—Apparatus for the electrostatic precipitation of suspended particles from gaseous fluids. 13th October, 1953. (734207.)

29949. Philips Electrical Industries, Ltd.—Cathode bodies and electric discharge tubes comprising such cathode bodies. 26th November, 1952. (734209.)

29955. Southern United Telephone Cables, Ltd.—Means for locating a leak in the sheath of an electric cable. 25th November, 1953. (734298.)

32085. N.G.N. (Electrical), Ltd.—High vacuum gauges and their method of manufacture. 18th December, 1953. (734211.)

32406. Morris Electrical Engineering Co., Ltd., J.—Contact carriers for electric switches. 18th December, 1953. (734301.)

1953

657. Marconi's Wireless Telegraph Co., Ltd.—Adjustable time measuring valve circuits. 7th December, 1953. (734138.)

3412. English Electric Co., Ltd.—Electric circuit-breakers of the air-break type. 5th February, 1954. (734217.)

3568. Murex Welding Processes, Ltd.—Welding electrodes. 5th February, 1954. (734219.)

5269. Philips Electrical Industries, Ltd.—Cathodes for use in electric discharge tubes comprising such cathodes and methods of manufacturing such cathodes. 25th February, 1953. (734311.)

5445. Allis-Chalmers Manufacturing Co.—Gas blast circuit-breakers. 26th February, 1953. (734372.)

5543. Licentia Patent-Verwaltungs Ges.—Electromagnetically actuated switching devices. 27th February, 1953. (734099.)

5768. British General Manufacturing Co. (1941), Ltd.—Electric wall brackets made of plastic. 10th February, 1954. (734224.)

6340. Kelvin & Hughes, Ltd.—Means for producing dispersion in electrical oscillations. 1st March, 1954. (734101.)

6828. Philips Electrical Industries, Ltd.—Devices for indicating and/or measuring ionizing rays. 12th March, 1953. (734314.)

8842. Westinghouse Brake & Signal Co., Ltd., and Martin, R. G.—Apparatus for the regulation of the voltage across a common load circuit supplied from two or more sources of direct current. 4th January, 1954. (734316.)

9801. Wayne Kerr Laboratories, Ltd., and Calvert, R.—A.c. inductive potentiometers. 2nd April, 1954. (734380.)

11807. Lucas (Industries), Ltd., J.—Electric current generators. 27th April, 1954. (734319.)

12297. Standard Telephones & Cables, Ltd. (Kellogg Switchboard & Supply Co.).—Electromagnetic counting device. 4th May, 1953. (734320.)

12314. Yardney International Corporation.—Separators and electrode assemblies for batteries or accumulators. 4th May, 1953. (734321.)

13013. Soc. Azionaria Mantovana Imprese Costruzioni e Navigazione.—Control arrangements for three-phase electric machines. 11th May, 1953. (734233.)

14156. Northrop Aircraft, Inc.—Cold cathode glow tube. 20th May, 1953. (734387.)

15421. Philips Electrical Industries, Ltd.—Photographic and kinematographic apparatus. 4th June, 1953. (734237.)

17367. General Electric Co.—Methods of vulcanizing rubber. 23rd June, 1953. (734390.)

18430. Chapman, G. S., and Goodall, J. S. H.—Electronic phase failure, earth leakage and unbalanced overload protection device. 4th February, 1954. (734326.)

18796. Philips Electric Industries, Ltd.—Ferromagnetic ferrite cores. 7th July, 1953. (734243.)

19744. Akt.-Ges. Brown, Boveri & Cie.—Arrangement for cooling a rotor winding located in the slots of a turbo alternator. 16th July, 1953. (734107.)

20543. Vierling, O.—Wireless transmission systems. 23rd July, 1953. (734329.)

24078. Siemens & Halske Akt.-Ges.—High frequency multi-layer conductor. 31st August, 1953. (734160.)

24194. Telefonaktiebolaget L. M. Ericsson.—Devices for demodulating duration modulated pulses. 1st September, 1953. (734333.)

25201. Claude-General Neon Lights, Ltd., and Symmonds, E. T.—Box signs. 9th September, 1954. (734393.)

25228. Siemens & Halske Akt.-Ges.—High frequency multi-layer conductors consisting of alternate thin layers of metal and insulation. 11th September, 1953. (734161.)

25770 and 25868. Siemens & Halske Akt.-Ges.—High frequency multi-layer conductors. 17th September, 1953. (734163/4.)

26214. Research Corporation.—Electrostatic precipitation apparatus for the removal of suspended materials from gases. 23rd September, 1953. (734165.)

27686. British Tabulating Machine Co., Ltd.—Electronic calculating machines. 8th October, 1953. (734253.)

29815. Babcock & Wilcox, Ltd.—Forced flow vapour generating units. 28th October, 1953. (734172.)

30332. Western Electric Co., Inc.—Methods of making semi-conductor bodies and devices utilizing them. 3rd November, 1953. (734255.)

32163. Compagnie Générale de Télégraphie sans Fil.—Devices for radio-electric direction finding. 19th November, 1953. (734173.)

33211. Calor-Emag Elektrizäts Akt.-Ges.—Busbar systems for electrical switchgear units. 30th November, 1953. (734174.)

34617. Siemens & Halske Akt.-Ges.—Carrier frequency submarine cables. 11th December, 1953. (734178.)

36181. Babcock & Wilcox, Ltd.—Cyclone furnaces and a method of operation thereof. 30th December, 1953. (734260.)

TRADE MARKS

APPLICATIONS have been made for the registration of the following trade marks. Objections may be entered up to 1st July:—

No. 720,402 (design), Class 9. DESSA. No. 720,469, Class 9. Measuring, indicating and recording apparatus, quantity meters; manometers (pressure gauges) for use with liquids and gases; calorimeters, thermometers, hygrometers, temperature regulators, thermostats, electric current transformers, condensers, capacitors, flat irons; vacuum cleaners, vacuum dust extractors, and carpet sweepers; electric kitchen utensils, etc.; floor polishing machines, machines for shampooing rugs, machines for picking up water from washed floors, machines for cleaning floors, and machines for oiling floors, all being electrically operated and all for domestic use; and electrical appliances for use in preparing and processing food.—Junkers & Co., G.m.b.H., Wernau am Neckar, Germany. Address for service, c/o Abel & Imray, Quality House, Quality Court, Chancery Lane, London, W.C.2.

SUPERTHANE. No. 729,338, Class 9. Insulated wire covered with synthetic enamel.—W. T. Henley's Telegraph Works Co., Ltd., 51-53, Hatton Garden, London, E.C.1.

PRESIDENT. No. 737,372, Class 9. Electric automatic regulating apparatus for controlling temperature, humidity, liquid level and rate of flow of liquids and gaseous fuels to burners.—J. R. Seville, Oaklea, Stansfield Road, Waterfoot, Rossendale, Lancs.

AERDAPTOR. No. 739,476, Class 9. Aerials and parts.—Shardlow Electric Wires, Ltd., Moseley Buildings, 56, Moseley Street, Manchester.

CONTRACT INFORMATION

Accepted Tenders and Prospective Electrical Work

CONTRACTS OPEN

Where "Contracts Open" are advertised in our "Official Notices" section the date of the issue is given in parentheses

Amble (Northumberland).—U.D.C. Electrical installations in 23 houses to be erected in St. Lawrence Avenue. Surveyor, Council Offices.

Argyllshire.—North of Scotland Hydro-Electric Board. Electrical installation in Kilmelsort power station and Loch Tralaig dam. (See this issue.)

Belgium.—6th July. Belgian Telegraph and Telephone Administration. Telephone equipment including commutators, current collector plugs, condensers, etc. (E.S.B. 12891/55. Ten/14209.)*

Birmingham.—6th July. City Council. Electrical installation in aged persons' home. (See this issue.)

Bridlington.—8th July. Borough Council. Two sets of electrically operated and controlled duplicate pumping plant for Wold Newton station. Water engineer, 11, Marton Road.

Canada.—11th July. Manitoba Electric Board. Four 30,000/40,000 kVA transformers for the Brandon generating station. (E.S.B. 13055/55. Ten/14247.)*

Clutton.—6th July. R.D.C. Electrical installations in houses (20) at High Littleton. Clerk of the Council, Temple Cloud, Bristol.

Egypt.—11th July. National Production Council. 15,000 sets of components for radio receivers. (E.S.B. 7063/55. Ten/14179.)*

Formosa.—11th July. Central Trust of China, U.S. Aid Division, Taipei. Tele-typewriters and electrical equipment including rectifiers, resistors, voltmeters, etc. (E.S.B. 12753/55. Ten/14182.)* 14th July. Battery boxes. (E.S.B. 12764/55. Ten/14177.)*

Hebburn (Durham).—U.D.C. Electrical installations in 120 houses on the Monkton Lane estate. R. C. Bestow, engineer and surveyor, Council Offices.

India.—4th July. Bombay Electricity Board. Substation equipment for the North Gujurat electric grid scheme, 2nd stage. (E.S.B. 12583/55. Ten/14154.)*

Iraq.—6th July. Director General of Municipalities, Bagdad. One switchboard for Halapcha power station. (E.S.B. 11241/55. Ten/14171.)* 220-240/440-480 V switchboard for Erbil power station. (E.S.B. 12807/55. Ten/14211.)*

Kuwait.—12th July. Government Electricity Department. Insulated cut-outs. (E.S.B. 4643/55. Ten/12831A.)

Llanelly.—8th July. Borough Council. Street lighting installations. (See this issue.)

Manchester.—4th July. Housing Committee. Electrical installations in flats (150) at aged persons' dwellings. Director of housing, Town Hall.

7th July. City Council. Supply of lamps. (See this issue.)

25th July. Education Committee. Electrical installation in Kirkmanshulme Grammar School. (See this issue.)

Monaghan.—7th July. Electrical installation in the nurses' home, Monaghan Mental Hospital. E. R. Ryan, consulting engineer, 1, Montpelier Terrace, Galway.

New Zealand.—20th July. Director-General Stores Division, G.P.O., Wellington. Potentiometers and resistors. (E.S.B. 12890/55. Ten/14193.)*

30th August. State Hydro-Electric Department, Wellington. 400 V switchgear. (E.S.B. 12828/55. Ten/14181.)* 13th September. One 50,000 kVA, 220/110/11 kV transformer bank and spare unit. (E.S.B. 12208/55. Ten/14138.)* 18th October. 50,000 kVA, 110/33/11 kV transformer bank and spare unit for Halfway Bush station. (E.S.B. 13008/55. Ten/14240.)*

Northern Ireland.—Electrical installations: 28th June. New voluntary school, Somerton Road, Belfast. 5th July. Proposed intermediate school, Warren Gardens, Lisburn. 7th July. New technical and intermediate school, Downpatrick. J. McCandless, consulting engineer, 6, Murray Street, Belfast.

6th July. Electrical installation in the new parochial hall, Kilrea, Co. Londonderry. R. B. Thompson, consulting engineer, 1, Waterside, Coleraine.

Philippines.—6th July. Chief Purchasing Officer, F.O.A., Manila. 10 kW, 110/220 V portable generator sets. (E.S.B. 12416/55. Ten/14152.)*

St. Eval (Cornwall).—7th July. County Council. Electrical installation in new junior and infants' school. (See this issue.)

Sleaford.—30th July. U.D.C. Street lighting equipment. (See this issue.)

South Africa.—6th July. Stores Department, South African Railways. 18 250 V portable insulation testers with bridge. (E.S.B. 12593/55. Ten/14145.)* 13th July. One 300 kVA, 11 kV/400 V transformer and two 10 kVA, 6·6 kV/100 V signal transformers. (E.S.B. 12594/55. Ten/14157.)* Paper insulated cable. (E.S.B. 12935/55. Ten/14213.)*

13th July. Natal Provincial Tender Board. Twelve pneumatic-electric traffic counters. (E.S.B. 13035/55. Ten/14241.)*

14th July. Union Tender and Supplies Board. P.v.c. cable. (E.S.B. 12672/55. Ten/14160.)*

Southern Rhodesia.—8th July. Tender Board, P.O. Box 8075, Causeway. 230 V bayonet type pearl electric light bulbs. (E.S.B. 12821/55. Ten/14164.)*

Stocksbridge.—18th July. U.D.C. Street lighting equipment. (See this issue.)

United States.—12th July. Bureau of Reclamation. 115-34·5 kV air switches and 500,000 kVA power circuit-breaker for Yankton substation. (E.S.B. 12808 and 12356/55. Ten/14176 and 14214.)* Three auto-transformers for Granite Falls substation. (E.S.B. 12395/55. Ten/14245.)*

Wigan.—15th July. Borough Council. Electrical installations in shops, etc., market hall extension. (See this issue.)

* Specifications may be inspected at the Export Services Branch, Board of Trade, Lacon House, Theobald's Road, London, W.C.1 (Chancery 4411; extension 769).

ORDERS PLACED

Bridgwater.—Town Council. Street lighting for the current year (£8,239).—General Electric Co., Ltd. Electrical installations in pre-war council houses (£2,315).—J. V. Taunton.

Consett (Durham).—U.D.C. Electrical installations in houses.—B. A. Berrie, Newcastle-on-Tyne (109 houses); W. Hinton, Blaydon (84 houses).

Durham.—County Education Committee. Electrical installations in schools: Broompark County School (£431).—T. Mitchelson; Bishop Auckland St. Anne's C.E. (£1,347).—Armstrong & Ryan; Blackwell County (£213).—James Paterson & Co.; Langley Park County Infants' (£238).—R. Robson; Bowburn County (£1,435).—Law & Burns; Neville's Cross Training College (£12,195).—Marlow Electrical Co.; Willington C.E. (£832).—R. V. Hogg & Co.

WORK IN PROSPECT

Particulars of new works and building schemes for the use of electrical installation contractors and traders. Publication in this section is no guarantee that electrical work is definitely included. Alleged inaccuracies should be reported to the Editors.

Altrincham.—Offices and stores for Liptak Furnace Arches, Ltd.; J. Cocker, architect, 5, Market Street.

Aylesbury.—Factory; Negretti & Zambra, Ltd., 122, Regent Street, London, W.1.

Bedford.—Extensions to Shire Hall; county architect, Bedford.

Belfast.—Eye, ear, nose and throat hospital proposed in Springfield Road; Northern Ireland Hospitals Authority, 44/46, Queen Street.

Bentley. — Secondary modern school (£160,000); C.C. divisional executive, Doncaster.

Bicester.—Dwellings (48), Oxford Road estate; U.D.C. surveyor.

Blackpool.—Extensions to factory at Devonshire Road for Symbol Biscuits, Ltd.; J. Gregson & Son, 3, Newhouse Road, Marton.

Boston.—First instalment of county offices for Holland C.C. (£50,000); county architect, Boston.

Bournemouth. — Rebuilding lounge and grand hall at the Town Hall; borough architect.

Cobham.—C. of E. secondary mixed school (£116,854), for Surrey E.C.; J. Harrison, county architect, County Hall, Kingston-upon-Thames.

Colwyn Bay.—Town hall, municipal offices and assembly hall in Queen's Gardens; N. S. Jeffrey, borough surveyor, Town Hall.

Coventry.—Shopping centre and flats, Henley Green Neighbourhood Unit, and extensions to council offices in Earl Street; city architect, Bull Yard, off Warwick Row.

Crawley.—Factory, industrial estate; K.D.G. Instruments, Ltd., Purley Way, Croydon.

Crediton.—Flats, Brays Close and Stanbury Court sites, for U.D.C.; F. W. Beech and E. Curnow Cooke, architects, 15, Dix's Field, Exeter.

Cumberland.—Primary school at Thursby, additions to Cleator Council School for the C.C.; J. H. Haughan, county architect, Portland Square, Tynemouth.

Darlington. — Houses (40), Branksome estate, and further instalments of new technical college; borough architect.

Machine shop, welding shop and laboratory, Brinkburn Road, for Whessoe, Ltd., engineers.

Doncaster.—Church at Central Boulevard for Rev. C. H. Cox; B. Miller, architect, 39, Bluecoat Chambers, School Lane, Liverpool, 1.

Dorking.—Offices and staff accommodation; Friends Provident & Century Life Office, 7, Leadenhall Street, London, E.C.3.

Durham.—Secondary modern school, North Lodge, Chester-le-Street, and medical centres at Consett, Washington and Hebburn (£17,000); county architect, Court Lane.

Blind persons' hostel, Durham City, for the C.C. (£46,000); Bell & Ridley, Ltd., builders, North Road.

Edinburgh.—Warehouse, Wheatfield Road/Gorgie Road site (£200,000); North British Distillery Co., Wheatfield Road.

Eynsham.—Secondary modern school; Oxfordshire county architect, Park End Street Offices, Oxford.

Gateshead-on-Tyne.—Factory for Jackson the Tailor, Newcastle-on-Tyne (£200,000); Shield Bros., Ltd., Back Park Terrace, Swalwell, Co. Durham.

Haydock.—Factory for Thos. Crompton & Sons, Ashton-in-Makerfield; C. S. Allott &

Son, consulting engineers, North Parade, St. Mary's Parsonage, Manchester, 3.

Hillingdon.—Maternity department (100 beds) at Hillingdon Hospital, Uxbridge, for North West Metropolitan Regional Hospital Board; regional architect, Sheffield House, Sheffield Street, London, W.C.2.

Jarrow (Co. Durham).—Houses (108), Calf Close Lane and at Simonside View; borough engineer.

Kingsbury (Middlesex).—Ambulance depot in Honeypot Lane (£26,920); county architect, 10, Great George Street, London, S.W.1.

Kingston-on-Thames.—Shops and offices, High Street; Donald Hamilton, Wakeford & Partners, architects, 7, Connaught Place, London, W.2.

Kingswood. — Factory, Wood Street; Thomas & Evans, Ltd., Porth, Rhondda.

Leicester.—Proposed R.C. school at Gwendolen Road; Bryan & Harding, architects, 8, New Street.

Leicestershire.—Erection of homes (£46,560 each), on sites at Ashby-de-la-Zouch and Coalville; county architect, 123, London Road, Leicester.

Littleport.—Secondary modern school in Parsons Lane; county architect, March, Cambs.

Liverpool.—Three R.C. schools, Kirkby estate; L. A. G. Prichard & Sons, architects, The Gables, Moor Lane, Kirkby.

Treatment block and canteen at Cleaver Hospital, for Regional Hospital Board; Morter & Dobie, architects, 11, Rumford Street.

Electrical installations in extensions at Clatterbridge General Hospital for Regional Hospital Board; Griersons, Ltd., Royal Liverpool Buildings.

London.—Offices, Deptford; Palmer's Wharves, Ltd., Prince Street, S.E.8.

Dwellings (76), Churchill Gardens estate, Westminster; Powell & Moya, architects, 36, Great Smith Street, S.W.1.

Flats (208), on demolition site, Austin Road/Chesney Street, flats (99), at Dagnall Street, and dwellings (32), at Sarsfield Road, Battersea; borough surveyor, Town Hall, Lavender Hill, S.W.11.

Flats (45), in five-storey and three-storey block, at Wendlesworth estate, Wandsworth, for B.C.; C. Lovett Gill, architect, 41, Russell Square, W.C.1.

Development scheme, Putney Hospital (£459,500), for South West Metropolitan Regional Hospital Board; architect to the Board, 76, Wimpole Street, London, W.1.

Long Eaton (Notts).—Factory at Nottingham Road for Wallis & Co. (Long Eaton), Ltd.; J. W. Wilcox, architect, 2, Waverley Street.

Long Lawford.—Houses (158), flats, shops, etc.; R.D.C. architect, Rugby.

Loughborough.—Thorpe Acre Primary School (£50,674) and R.C. secondary modern school; county architect, Leicester.

Luton.—Houses (228), Vauxhall Park estate; H. C. Janes, Ltd., 183, Hightown Road.

March.—School clinic for Isle of Ely County Council (£9,700); county architect, March, Cambs.

Middlesbrough.—Houses on 340 acres at Ormesby and maternity and child welfare centre, Overdale Road, for the T.C.; J. A. Kenyon, borough engineer.

Millom (Cumberland).—Factory additions for West Coast Tanneries, Ltd.; R. Ward and Partners, architects, 33, St. George's Drive, London, S.W.1.

Newbury.—Development of industrial site at Northway; Marsham Tyre Co., Ltd., tyre distributors, 207, Oxford Street, London, W.1.

Newcastle (Staffs).—Development of site at King Street; Swettenhams, Ltd., merchants, London Road, Chesterton, Stoke-on-Trent.

Newcastle-on-Tyne.—Factory and garage for Carter Horsley, Ltd., St. Lawrence Road.

Bus station in Scotswood Road; P. Parr, city engineer.

North Riding.—Grammar and modern school at Thirsk; Leathart, Son and Tingay, architects, 49, Welbeck Street, London, W.1.

Northumberland.—R.C. primary and technical school at Whitley Bay, C. of E. secondary modern school at Ponteland, and county modern school at Sunnyside, Tweedmouth, for E.C.; C. C. Brown, county architect, County Hall, Newcastle-on-Tyne.

Peterborough.—Buildings for offices, stores, ambulance and fire station in Oxney Road; F. Perkins, Ltd., diesel engine manufacturers, Oxney Road.

Plymouth.—Warehouse and offices, Sutton Road; H. Lawry, Ltd., Exeter Street.

Preston.—Extensions to Ribbleton Avenue C.P. School (£28,876); J. Whittaker & Sons, Ltd., Blackburn.

Ramsgate.—Reconstruction of West Cliff Hall; borough surveyor.

Redditch.—Factory, Hewell Road; M.E.M., Ltd., Reddings Lane, Birmingham, 11.

Rotherham.—Factory in Brinsworth Street; Montgomery Skinner & Co., Ltd., steel manufacturers, Pagoda Steelworks, Sheffield, 9.

C. of E. centre at Manor estate; Major G. G. Pace, architect, Woodlea, Skelton, Yorks.

Sacriston.—Cinema to seat 850; Cheeseman, Tucker & Cook, Queens Road, Blackhill, Consett, Durham.

Salford.—Warehouse and showrooms at The Crescent; Charles Churchill & Co., Ltd., engineers, machinery, tools, etc., 57, St. Simon Street, Blackfriars, Manchester, 3.

Sheffield.—Premises at The Moor for Montague Burton, Ltd.; M. Harrison & Co., Ltd., Post Hill Quarries, Farnley, Leeds.

Shotley Bridge.—Community hall (£9,000); county architect, Court Lane, Durham.

Southport.—Houses (42), Dock Lane, flats (67), Albert Road/Leicester Street site, and conversions at Kenworthy's Hotel, to form flats (40); borough architect, 93-105, Lord Street.

South Shields.—Offices, etc., at Templetown for C. W. Taylor and Sons, engineers and ironfounders; Couves and Partners, architects, Carliol House, Newcastle-on-Tyne.

Stalybridge.—Houses (72), Copley estate; borough surveyor, Town Hall.

Stevenage.—Factory extension for Development Corporation; architect's department, Aston House.

Stockingford.—Alderman Smith School (£220,000); G. Ashton, surveyor, Nuneaton.

Stockton-on-Tees. — Works extensions; Harker & Son (Engineers), Ltd., Church Road.

Houses (200), west of Fairfield Road, and transport depot, Boathouse Lane (£250,000); borough architect.

Stratford-on-Avon.—Flats (32) and houses (20), Redlands estate; borough surveyor.

Sunderland.—Premises for Pennywell Workmen's Club (£23,000); J. M. Angus, architect, 21, Lovaine Place, Newcastle-on-Tyne.

Houses on the Bainbridge Holme estate for R. L. S. Pemberton; G. T. Brown and Son, architects, 53, Fawcett Street.

Sutton Coldfield.—Houses (200), proposed in the Rectory Road area; Herbert Johnson, Ltd., builders, 609, Walsall Road, Great Barr, Birmingham, 22a.

West Sussex.—Secondary modern schools at Hill Road, Littlehampton, and Depot Road, Horsham; F. R. Steele, county architect, County Hall, Chichester.

Worcester Park.—Petrol filling station, garage and showrooms; The Mercia Motor Co., Ltd., Central Road.

Workington.—Large store at Murray Road for Workington Beehive Co-operative Society, Ltd.; J. Saul, architect, National Provincial Bank Chambers.

Worthing.—Public library, Mulberry Lane, Goring; borough engineer.

Wrexham.—Fire station for C.C.; Wm. Gittins, Ltd., Johnstown, Wrexham.

Yeovil.—Flats (72), on the Sunningdale estate, for T.C.; Petter, Warren & Roydon Cooper, architects, West Hendford, Yeovil.

York.—Dwellings (52), Don Avenue and Barkstone Avenue; city architect.

Overhead Line Fatalities

At inquests at Nelson (Lancs) on two Keighley yachtsmen, P. D. Jagger, aged 26, and B. Jaques, aged 21, who were killed when the mast of Jagger's racing dinghy struck an overhead 6,600 V line on the bank of Lake Burwain, Foulridge, near Colne, on 15th June, verdicts of " Misadventure " were recorded. It was stated that the two men were seen to take a boat from the boat pen and pull it along the embankment on a truck. As they were going along the banking they were seen to start sliding down the banking. As they were trying to stop the boat from slipping they shouted, but immediately they dropped and their boat began to smoke.

The secretary of the Lake Burwain Sailing Club said that originally low-voltage wires were erected across the western end of the lake, and the attention of all members was drawn to the possibility of catching the wires. He believed the high-voltage wires were put up during the 1953-54 winter, and he had suggested to the Board that they should be put underground. The reply of the Board was that it was the responsibility of club members to ensure that accidental contact with the wires should not occur, and further the letter pointed out that not only would such contact prove dangerous to life, but it would also affect the supply to consumers. The Board was not prepared to consider putting the lines underground unless the club was prepared to pay the full cost. Instructions had been given to competitors in the regatta drawing their attention to the wires and it was stressed that masts must be removed from the dinghies before any attempt was made to move them.

Mr. J. M. Collins, who appeared for the North Western Electricity Board, gave an assurance that serious consideration would be given to the possibility of raising the height of the overhead cables. Mr. George E. W. Hird, district engineer of the Board, agreed with the Coroner that there was no technical difficulty involved in lengthening the poles and raising the wires, and he would say it was purely a monetary difficulty.

Recording his verdicts, the Coroner said the committee foresaw the possibility of a fatality as soon as its attention was drawn to the overhead wires. He thought the Electricity Board might well consider, in the future, foregoing their rights under the regulations in the interests of public safety.

we don't want to be big headed about it-

—but we feel sure you will forgive us for claiming, in all due modesty, to be well *ahead* of all competitors in the production of Immersion Heaters.

Take our newest development:
They do say, "Pat a man on the back and his head swells." Well, in our case we are patted on the back because our head has been reduced to about half normal size.

This reduction in the size of the terminal cover is the latest attractive feature of the **"SLIMROD"**, a single-pocket Immersion Heater designed to "fit the pocket" of all.

There are four lengths for vertical fixing through the top dome of a hot water cylinder, and two lengths for inserting through the side of a tank or cylinder.

Leaflet No. 81 gives fullest details of the **"SLIMROD"**.

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Manufrs. of: Electric Water Heaters, Oil Heaters, Immersion Heaters, Urns, Towel Rails, Electric Fires, Breakfast Cookers, Flameproof Heating Apparatus, Airing Cupboard Heaters, Food Trolleys, Warming Plates, Air Heaters, etc.

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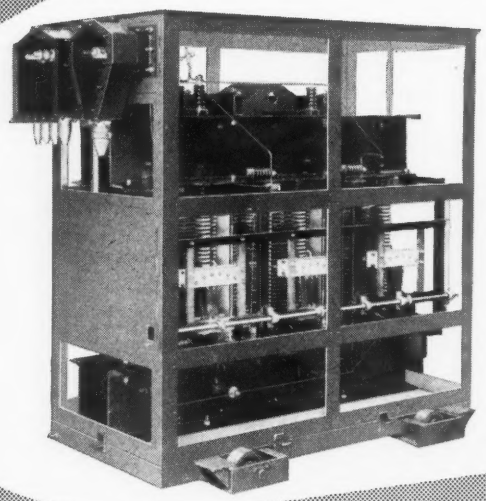

BRENTFORD 750 kVA
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The Backbone of Class 'H' insulation...

The insulating properties of Fibreglass are already widely applied in the electrical industry. Fibreglass is also combined with silicone compounds : chemical hybrids which possess much of the heat stability, inertness and electrical non-conductivity of glass-fibre. The result is Class H insulation, the basis of the revolutionary new dry type transformers.

What are the advantages of this Fibreglass-silicone Class 'H' insulation?

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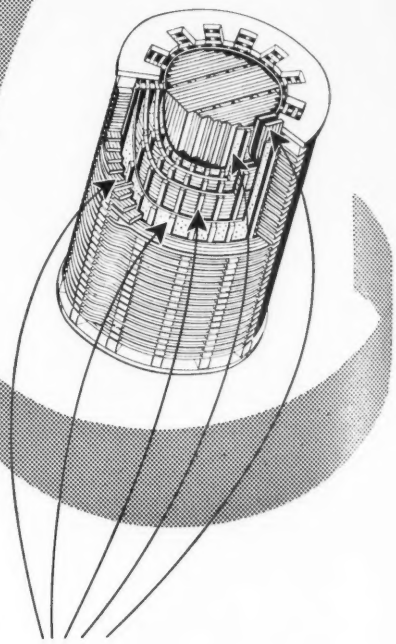

Where does Fibreglass play its vital role? Here, here . . . and here

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32,575 AMPS AT 7·5/10 VOLTS . . . .

. . . Power for Plating,

at the works of the Decca Record Company Ltd., is provided by a number of Davenset oil immersed selenium metal rectifiers. Part of the installation is shown in this photograph. This is one of many such installations in this Country and overseas.

* *The equipment was supplied by Roval Ltd., Brimsdown; photograph by courtesy of the Decca Record Company Ltd.*

DAVENSET

ELECTROPLATING RECTIFIERS

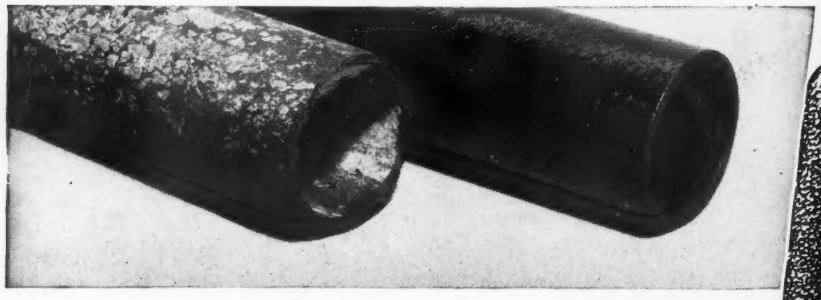
PARTRIDGE WILSON & CO. LTD., Davenset Electrical Works, Leicester

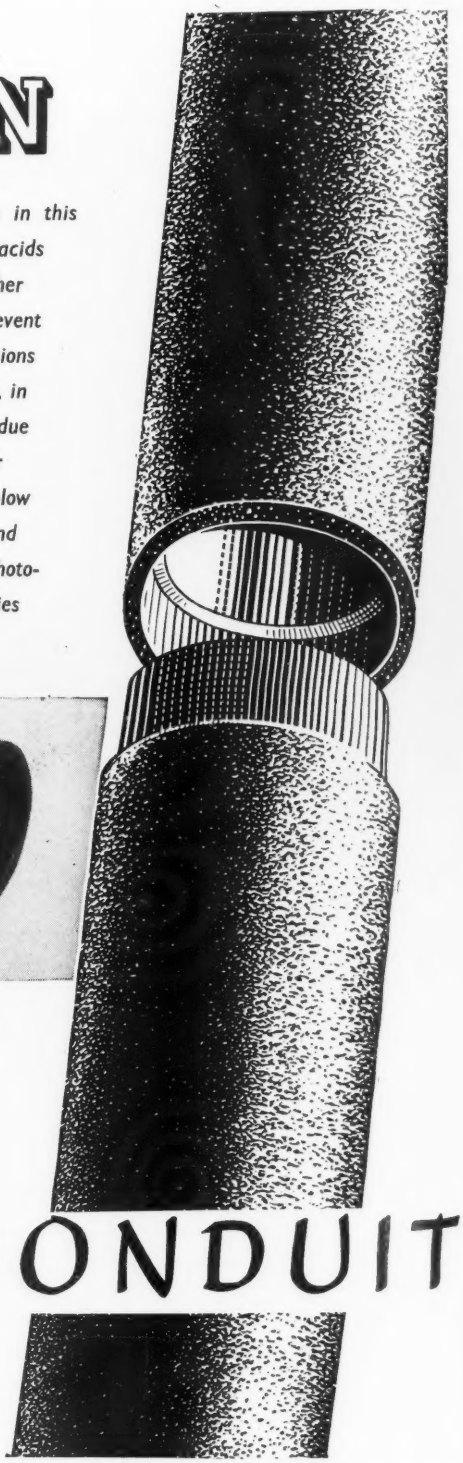
"KEY" POINTS * NUMBER THREE

See the Building Research Station Digest No. 67

PROTECTION

The nature of Key Fibre Conduit construction provides unique properties in this field. Firstly, there is absolute and complete protection against electrolysis, acids etc.; secondly, no material is used that could in any way corrode lead or other sheathing and thirdly, the material possesses fire resisting qualities—in the event of cable breakdown the conduit will not crack and fail under the heat conditions produced. Key Fibre Conduit is completely impervious to root action and is, in fact, toxic to these and fungoid types of growth — it does not crack or leak due to earth movement or vibration and is unaffected by sulphates and other chemicals found in soil. It ***always*** *remains watertight. The illustration below shows a piece of Fibre Conduit removed after more than 30 years underground —side by side with a piece taken from a current production run. Original photograph is available from our Head Office. The physical and chemical properties of Key Fibre Conduit make it perfect for its job.*





*Other Key points are: *Extreme lightness, effecting economy in storage, cost of transport, handling and laying. *Smooth interior surface which cannot damage lead sheathed cable. *Simplicity in jointing. *Machined joints—perfectly aligned and absolutely watertight. *Fractional or nil breakage in transit. *Resilient to vibration.*

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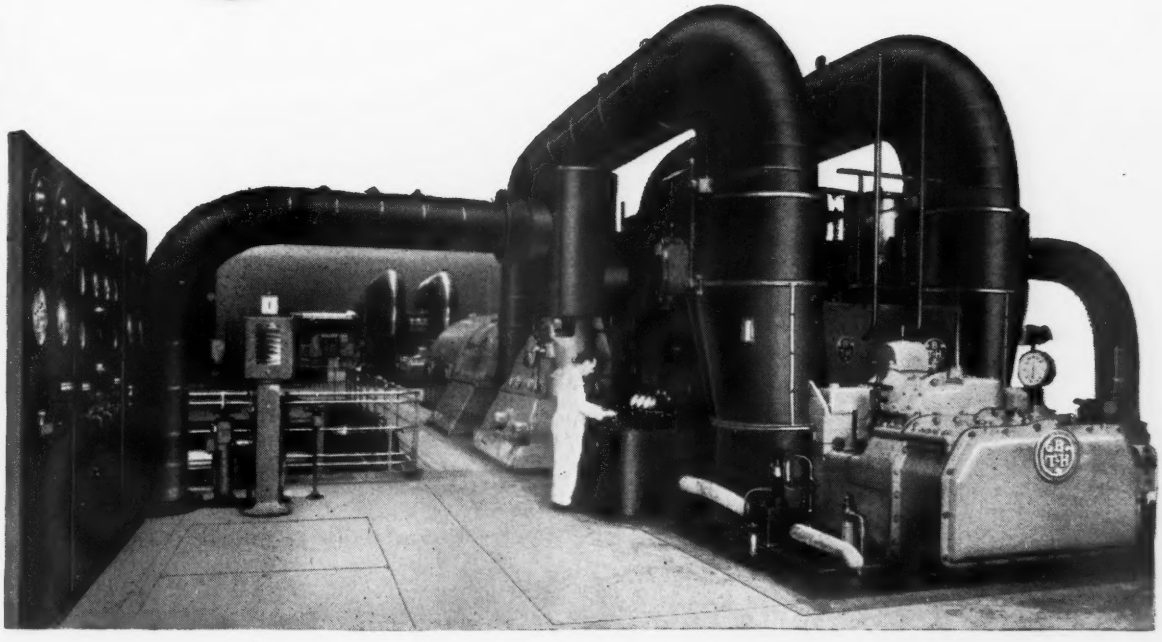
And at Trafford Park, Manchester. Tel.: Trafford Park 1903.

DHB

Shift Operation

of

TURBO-ALTERNATORS



Bankside 'B' Power Station

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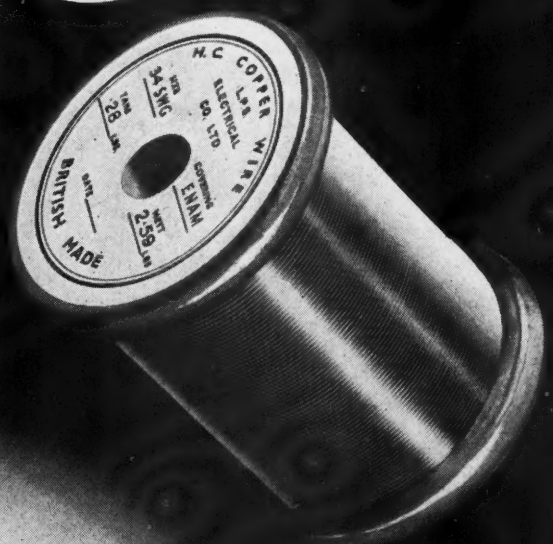

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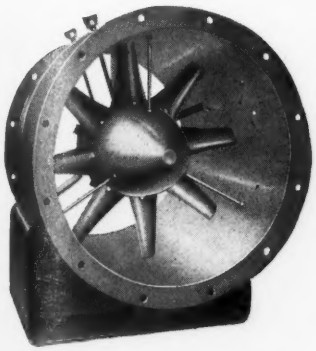

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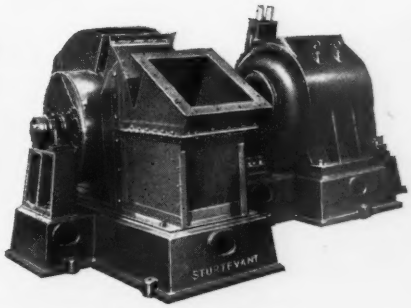

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'ENGLISH ELECTRIC', the world-famous manufacturers, use FRY'S Alcho-Re flux in many soldering processes. The above picture (reproduced by kind permission of The English Electric Company Limited) shows the flood-soldering of armature coil leads to the commutator of a DC traction motor. Throughout this process Alcho-Re flux is used for all soldering.

when it's Safety First – use ALCHO-RE FLUX

Alcho-Re fluxes are exceptionally fast in operation, ensure a good spread of solder and are guaranteed non-corrosive. FRY'S Alcho-Re fluxes conform to specification DTD 599 and can be released through our own AID or ARB organisations. Please write for samples and copies of our booklet "*Fluxes for electrical work*".

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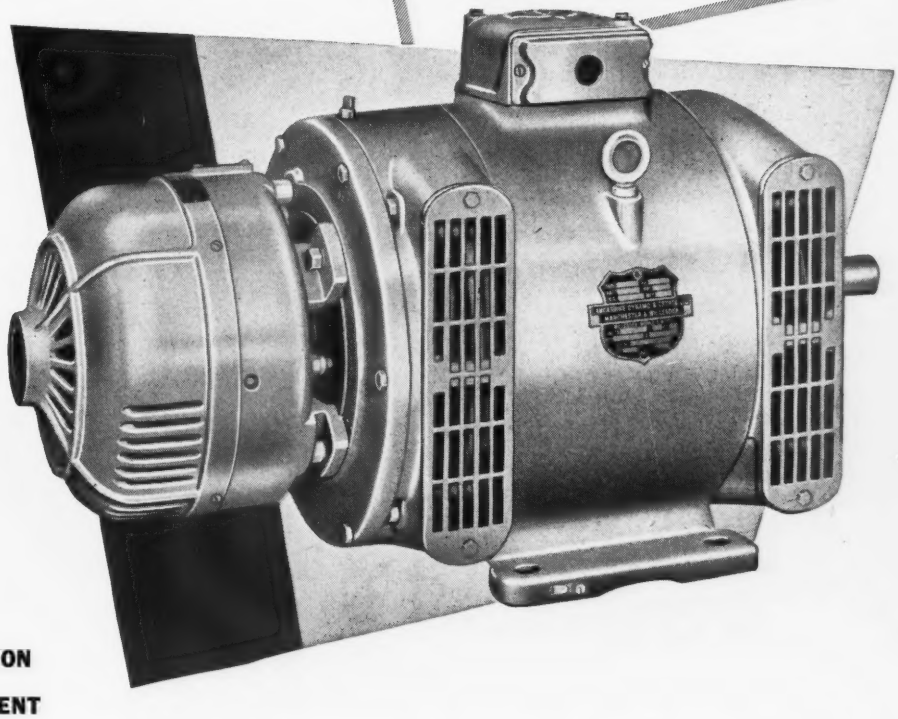

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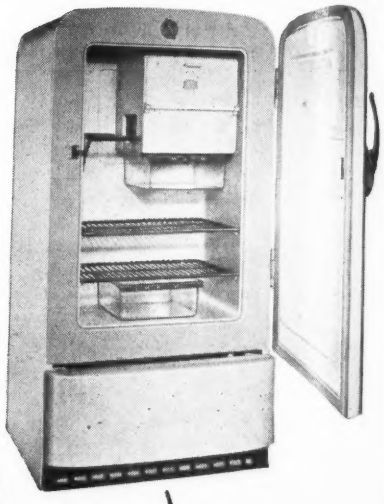

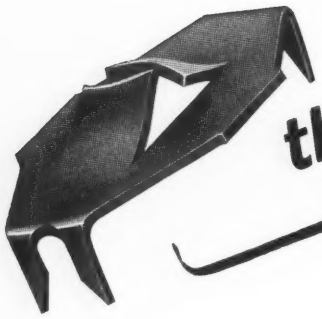

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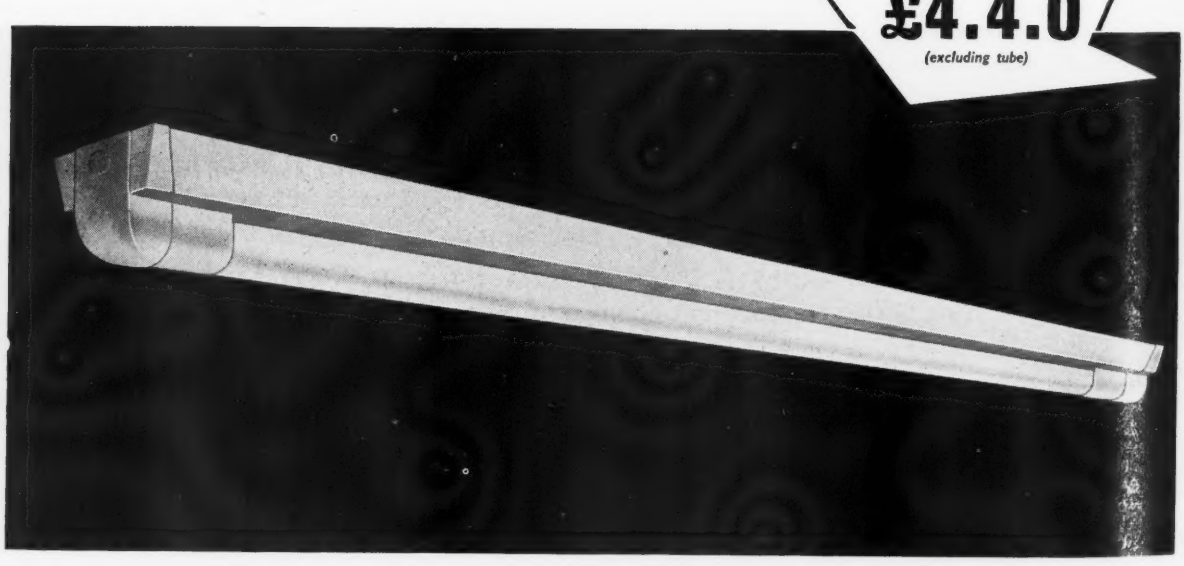

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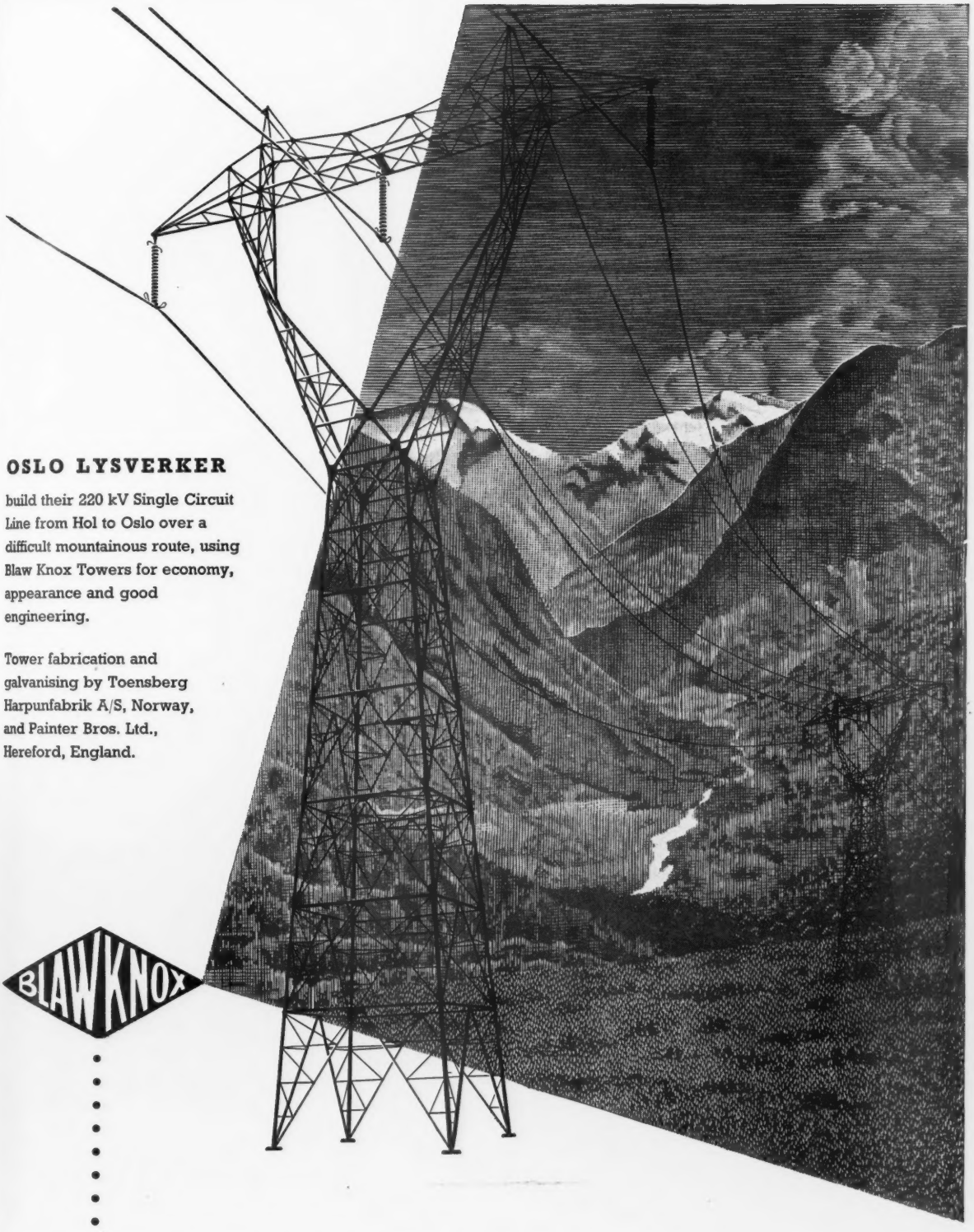

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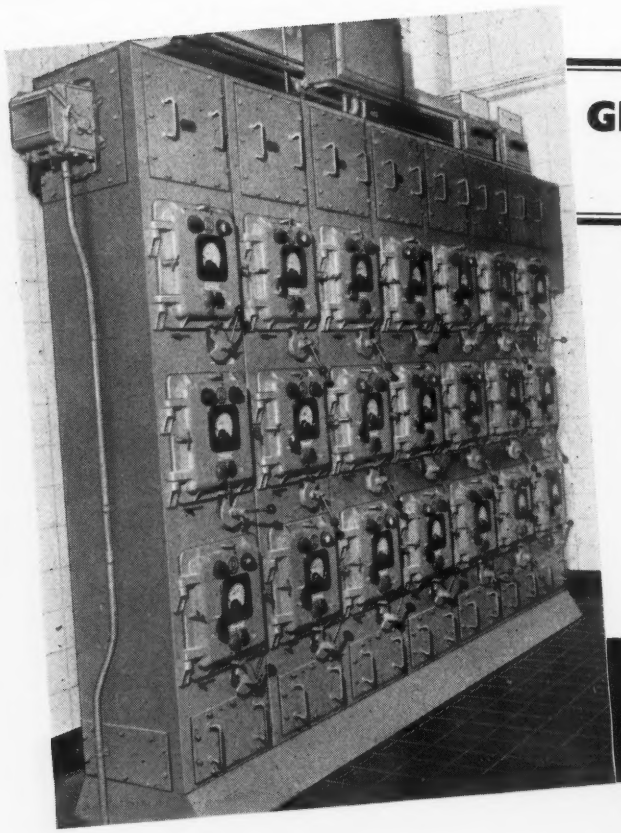
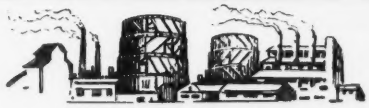


GROUP MOTOR CONTROL SWITCHBOARDS



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All are of heavy dustproof construction, arranged for centralised control of groups of motors with sequence interlocking when required.

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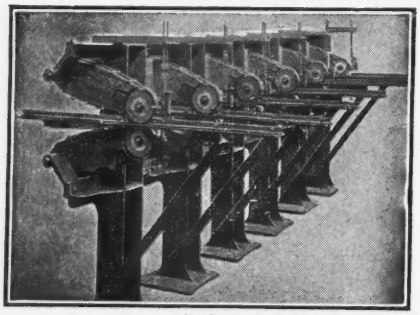

For removing the scale from 2 surfaces on one edge of plate simultaneously, preparatory to welding.

A batch of single-ended Pedestal Type

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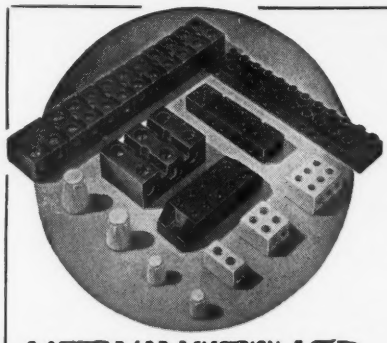

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MOULDED TERMINAL BLOCKS AND PORCELAIN CONNECTORS

These are fully described in our Catalogue **No. NBL/2/ER**

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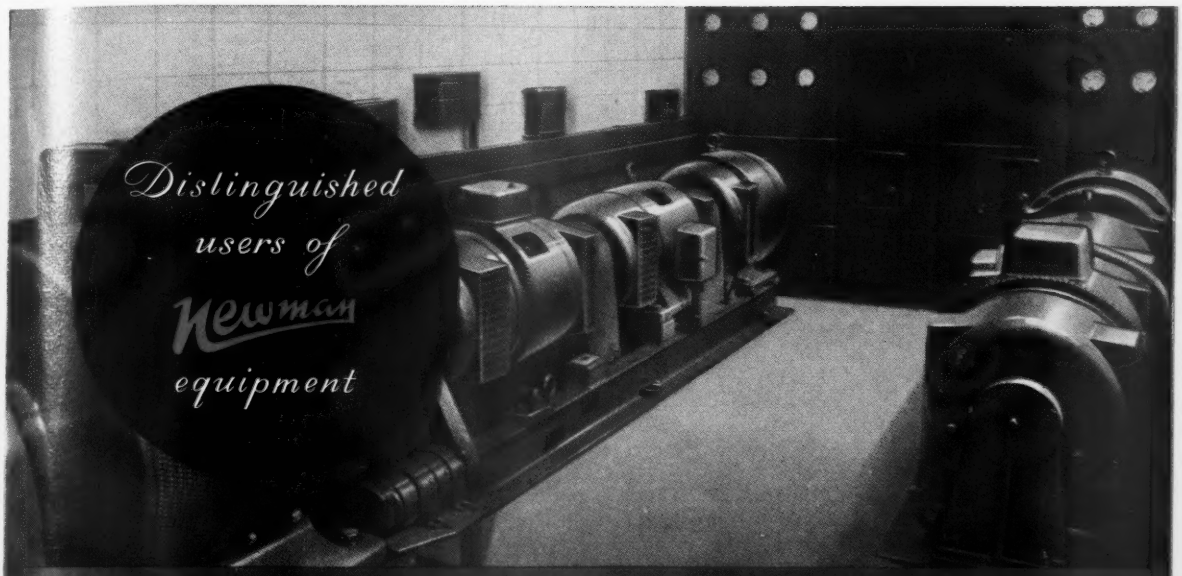

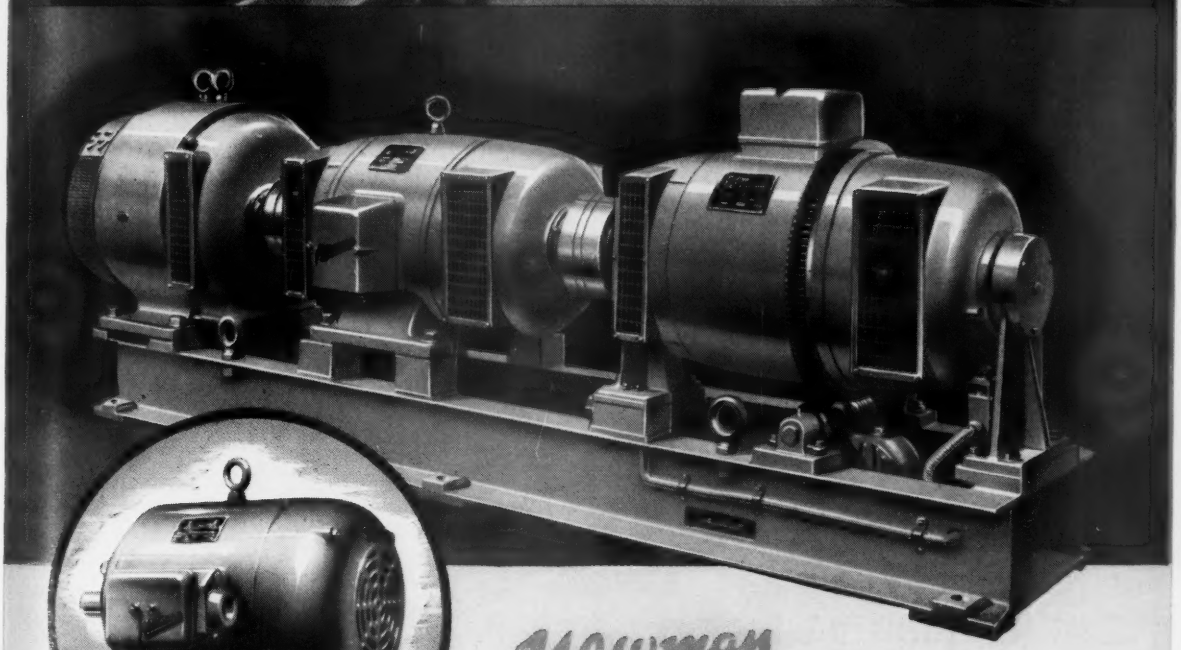

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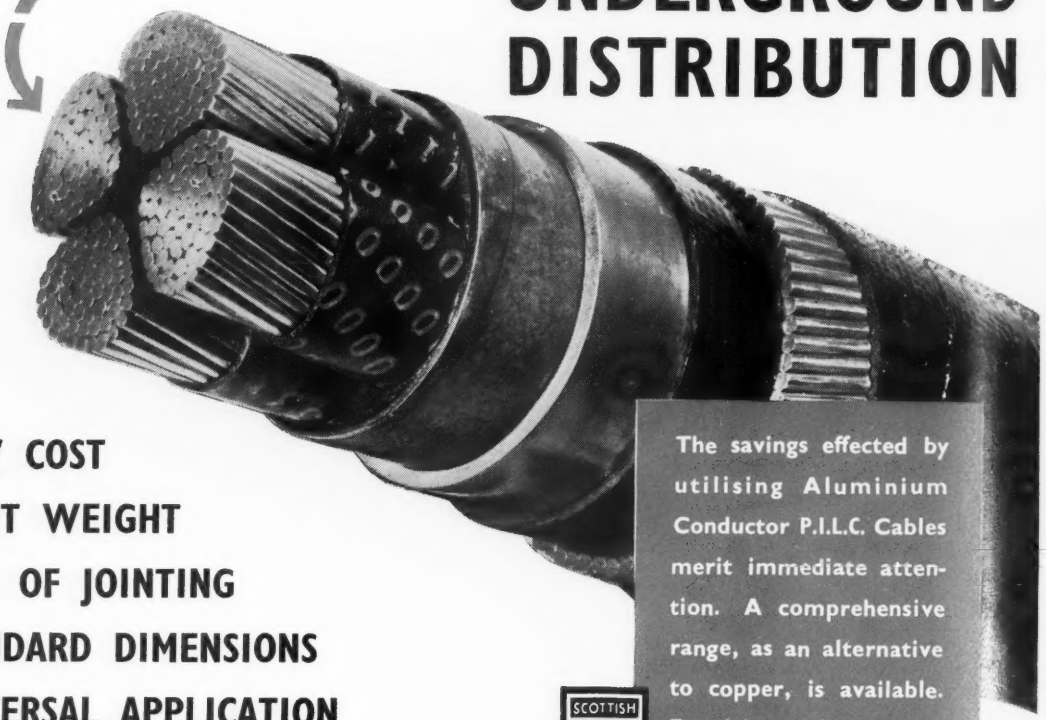

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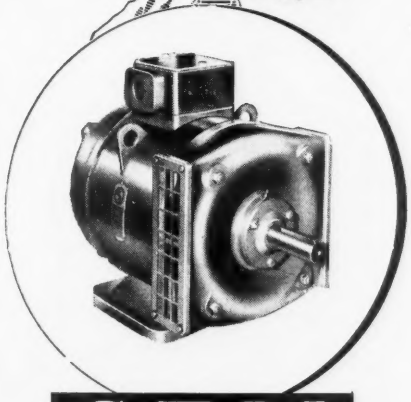

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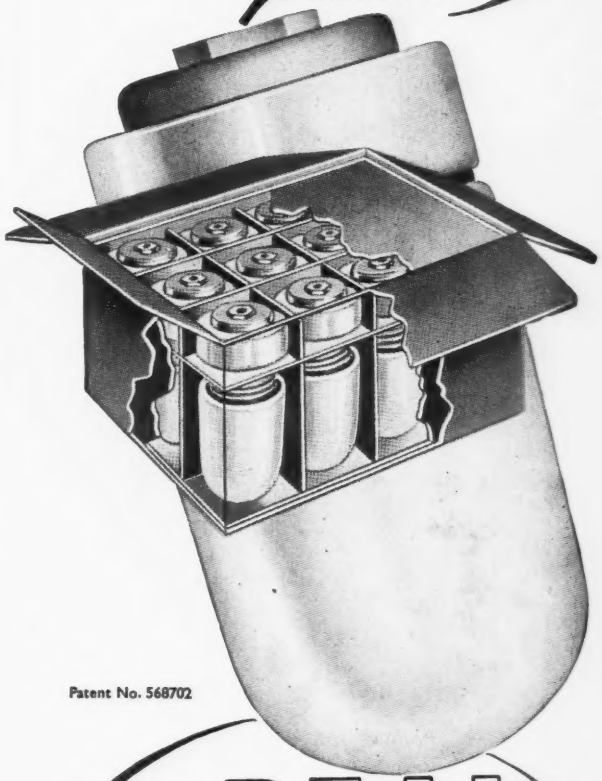

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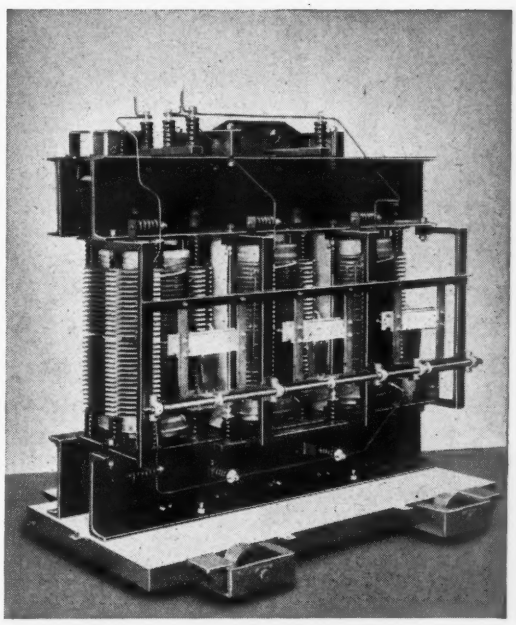

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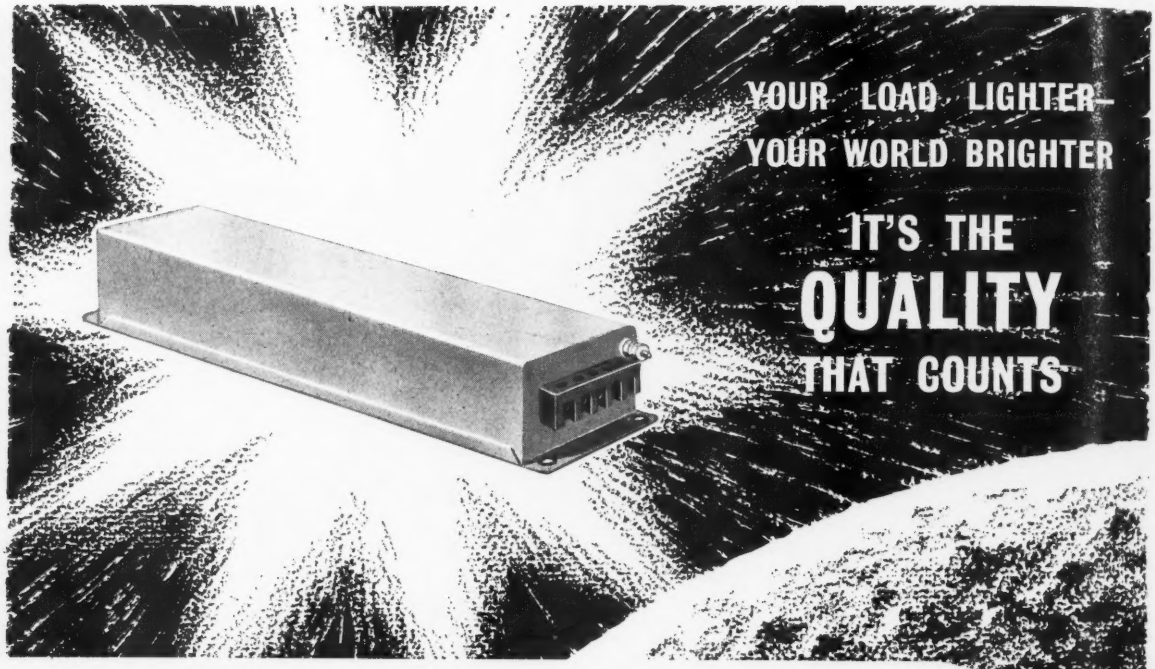

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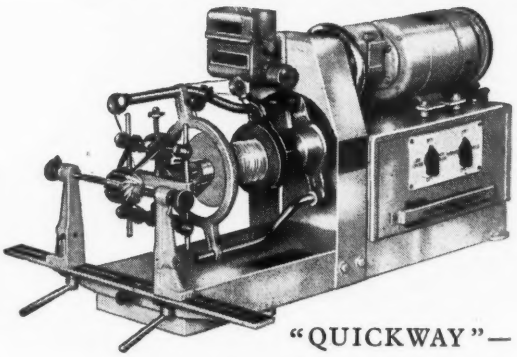

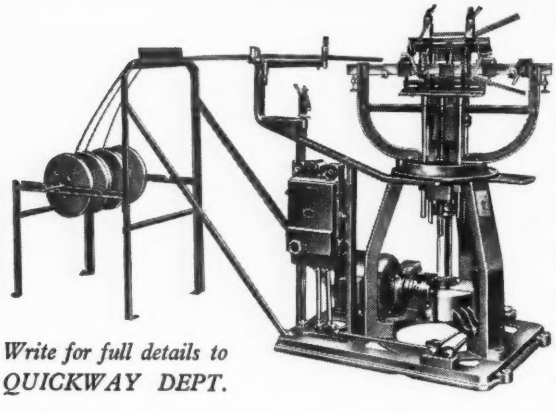

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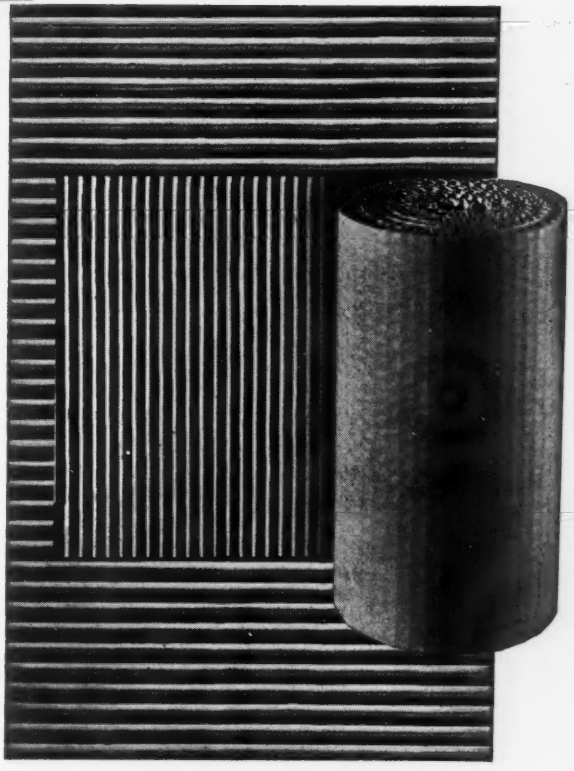

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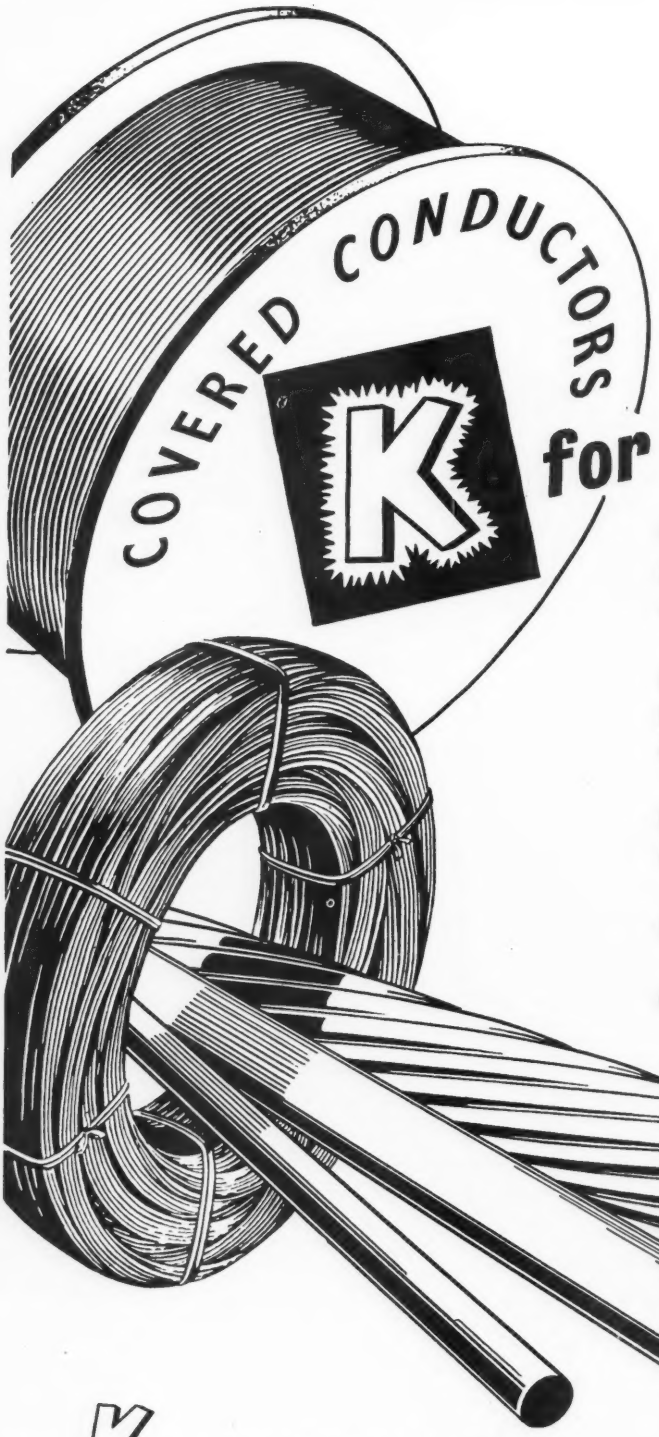

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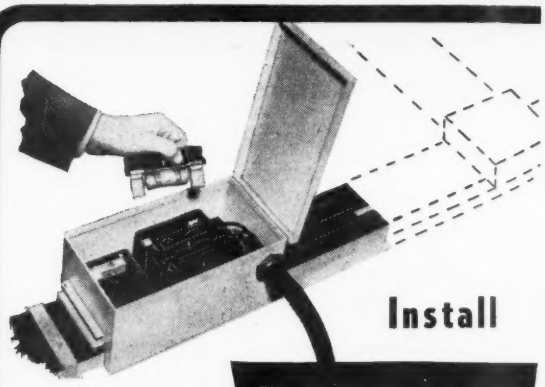

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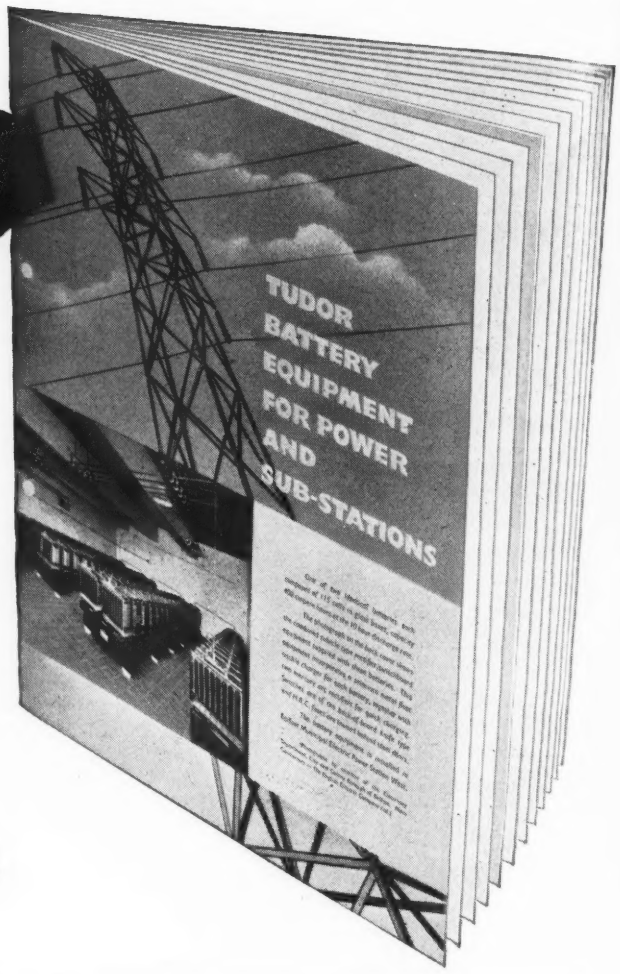

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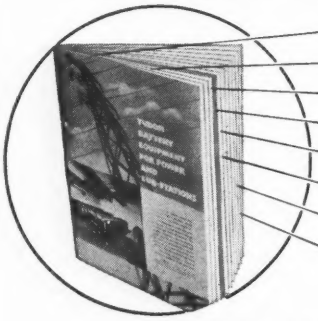

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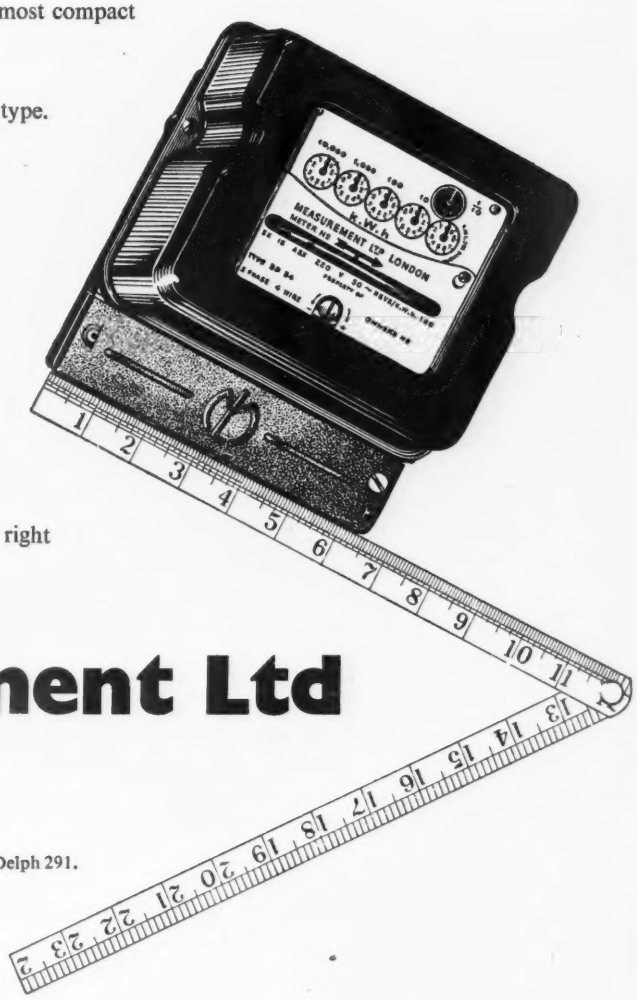

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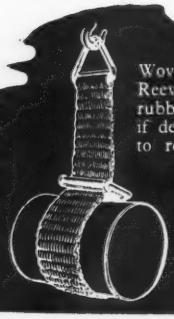

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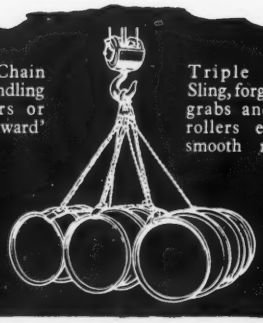

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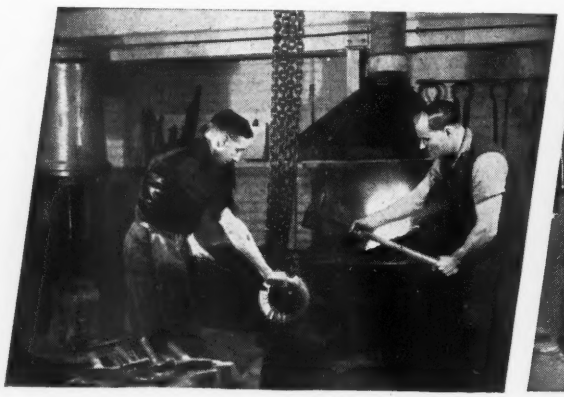

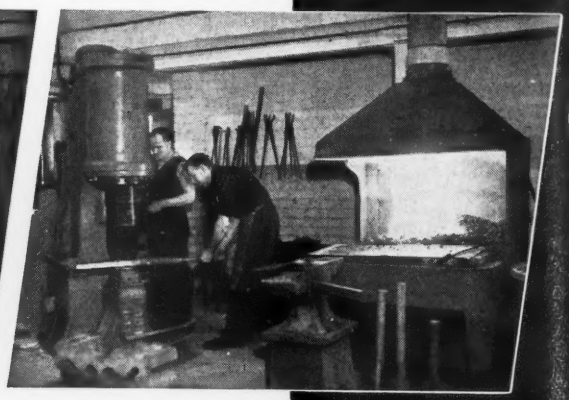

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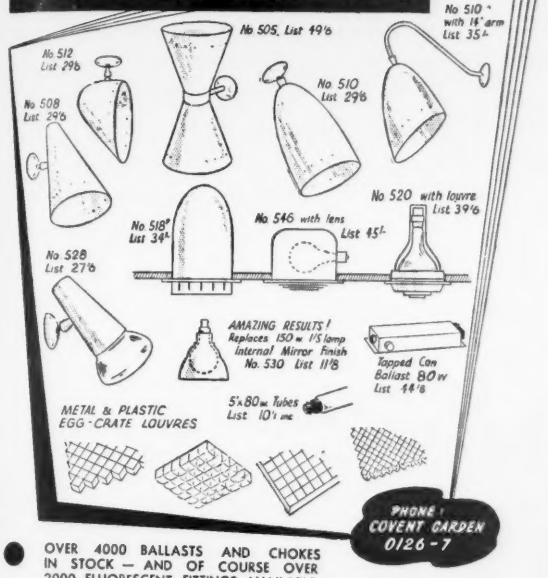
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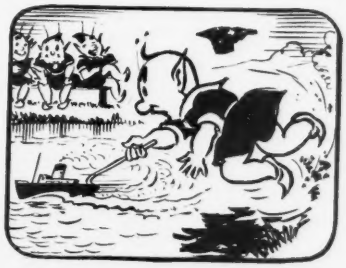

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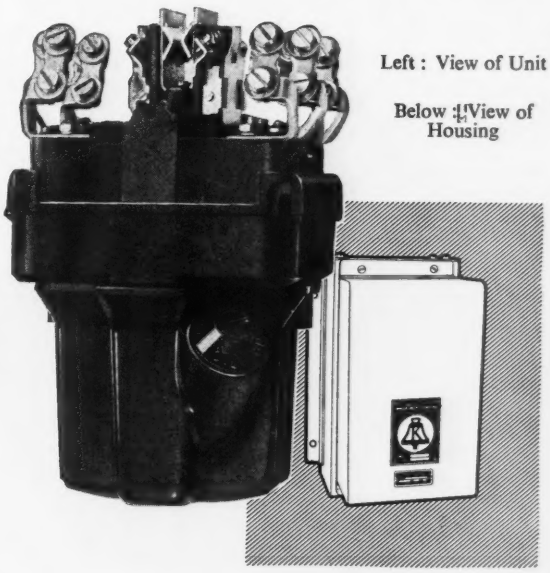

Left : View of Unit

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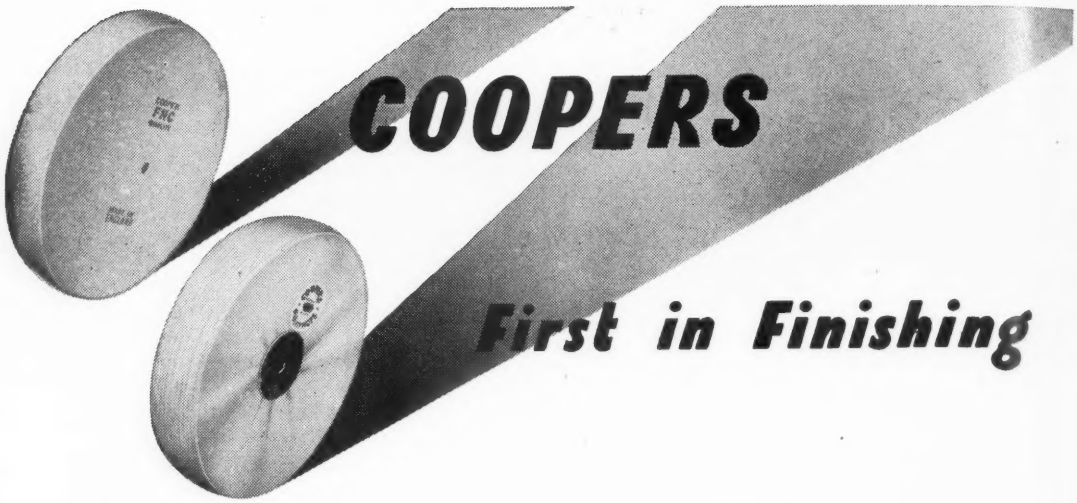

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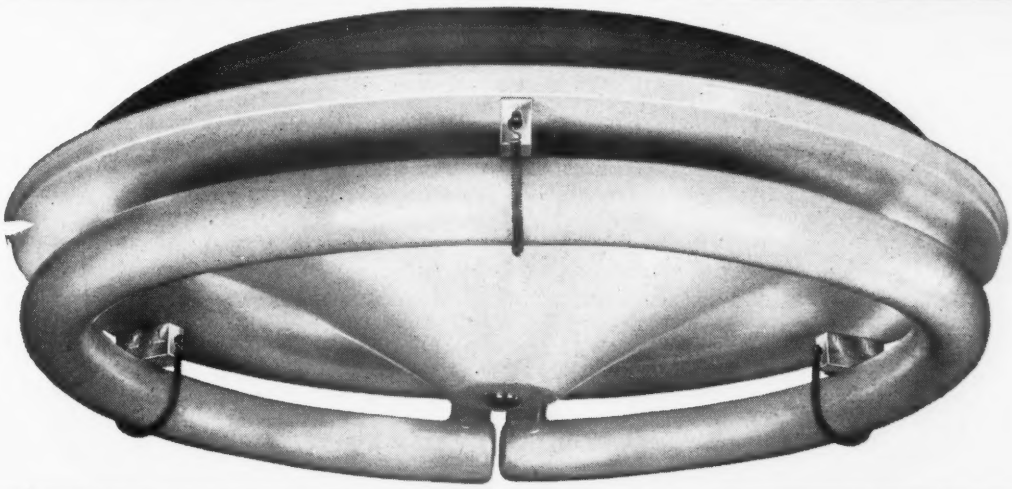
LIGHTING FITTING

80—WATT INDUSTRIAL TYPE



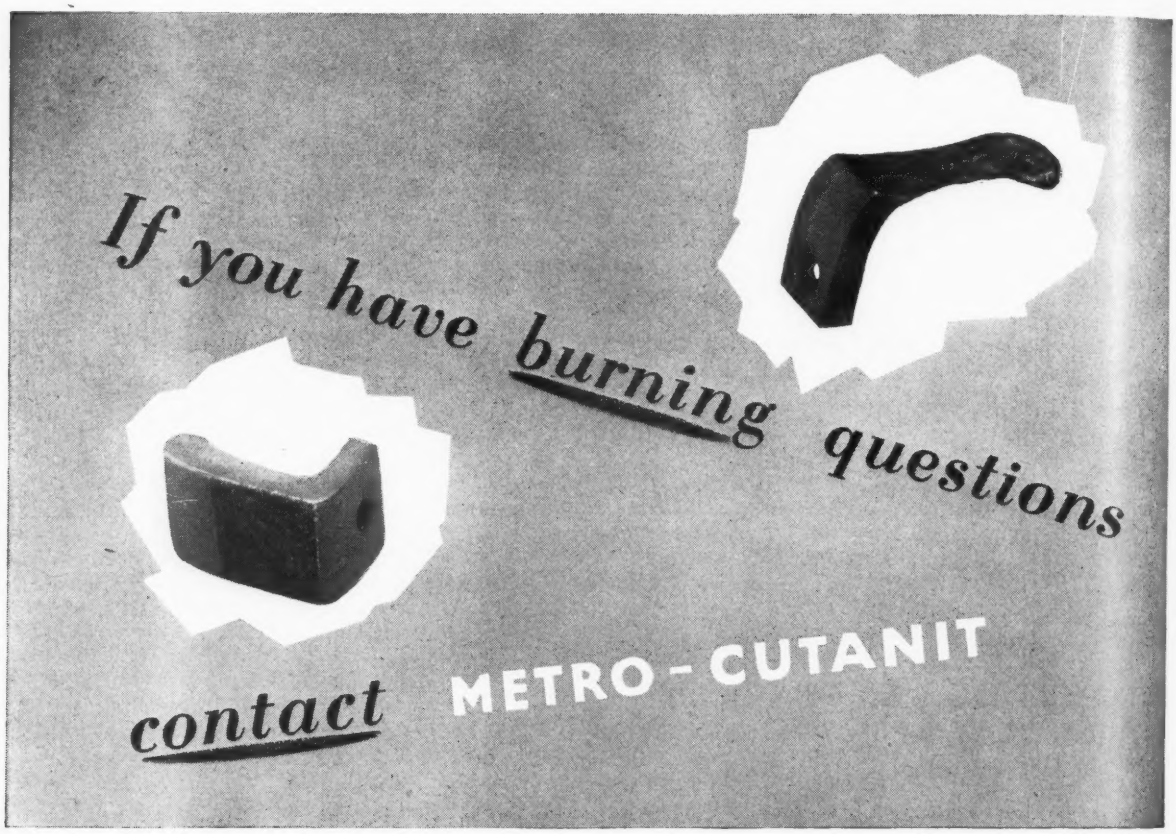
A combination of maximum light output and even light distribution has been achieved with this fluorescent lighting fitting. The reflector, which has been specially designed and has a white stove enamelled finish, is secured by a central screw to an instant-start "Transtar" unit housed within the fitting.

The fluorescent tube, which is manufactured in standard colours for this fitting, is mounted on "Perspex" pillars attached to the reflector and is secured by quick-release spring fasteners.

This fitting can be supplied suitable for either chain attachment or conduit adaptor, and its overall dimensions are: diameter $20\frac{1}{2}''$ and $6''$ in depth.

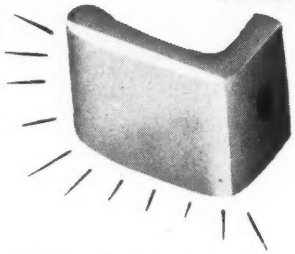
E. N. MACKLEY & COMPANY
PROPRIETORS: CLARKE CHAPMAN & CO. LTD.
Hawks Road Gateshead on Tyne Co. Durham
Telephone: Gateshead 72237 Telegrams: 'Hylift' Gateshead

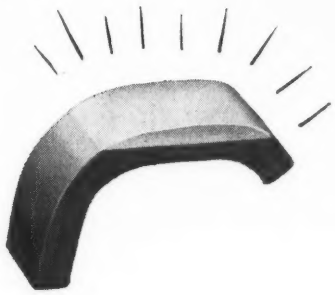
LONDON OFFICE: Dunster House, Mark Lane, E.C.3. Telephone: MINcing Lane 8345-6-7 Telegrams: 'Cyclops' Easphone, London.
REPRESENTATIVES: Berry Hill Plant Division, Cheadle, Staffs. Telephone: Cheadle 2181 & 2261. Telegrams: 'Berry Hill' Stoke-on-Trent.



ELMET FACINGS

may supply the answer





The correct use of Elmet facings will:

Resist burning and wear.
Prevent melting and welding of contacts.
Reduce maintenance and downtime.
Give long life in highly inductive circuits,
and permit high rates of operation.

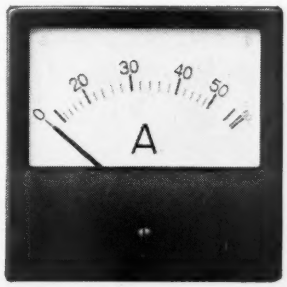
METRO-CUTANIT LTD.

ASSOCIATED WITH METROPOLITAN-VICKERS ELECTRICAL CO. LTD.

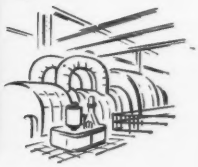
GRAPPENHALL WARRINGTON LANCASHIRE

Telephone: GRAPPENHALL 906 (3 lines)

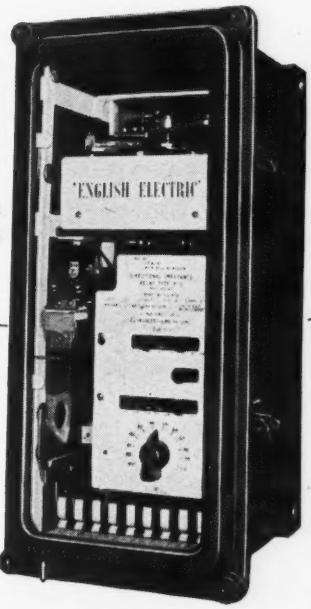
Supplier to Consumer



INDICATING INSTRUMENTS



PROTECTIVE AND AUXILIARY RELAYS



INTEGRATING METERS

'ENGLISH ELECTRIC'

meters, relays and instruments

See our Exhibits on

STAND No. 1 • BLOCK B • 1st FLOOR

British Instrument Industries Exhibition

Earls Court, June 28—July 9

THE ENGLISH ELECTRIC COMPANY LIMITED, QUEENS HOUSE, KINGSWAY, LONDON, W.C.2

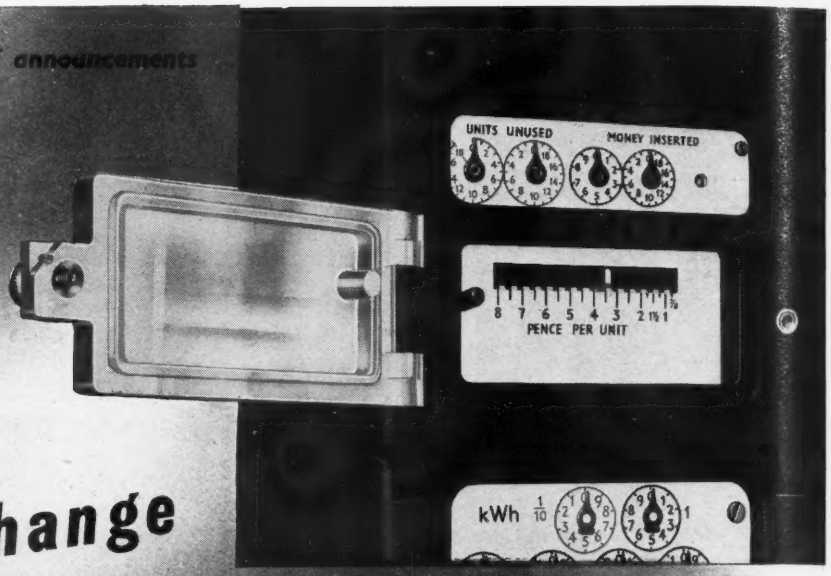
WORKS: STAFFORD • PRESTON • RUGBY • BRADFORD • LIVERPOOL • ACCRINGTON

NS.23A

See also our Fusegear and Steam Turbines advertisements in this issue

B

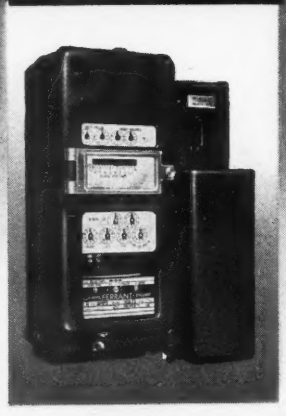
No. 2 *in a series of announcements*



Simple Price Change

In the FMP Prepayment Meter the price per unit is changed by simply opening a small dust-tight window and moving a self-locking price-change lever to the required price per unit. There are no loose parts to be changed or to get lost.

FERRANTI FMP PREPAYMENT METER



The Ferranti FMP Prepayment Meter

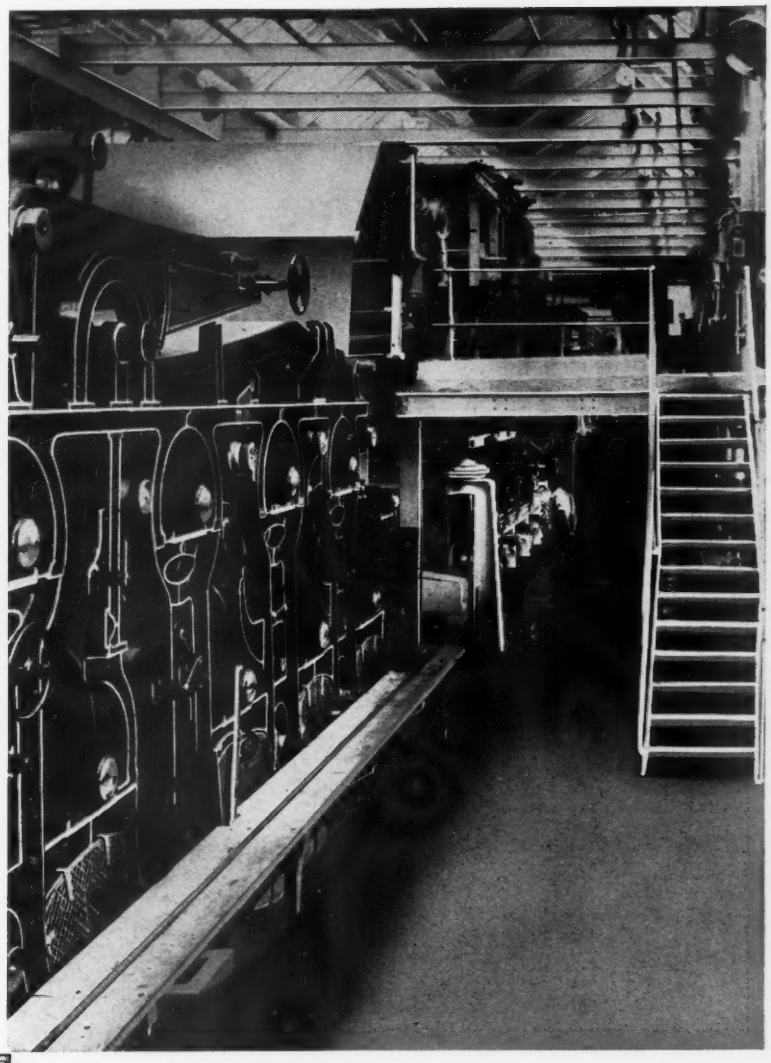
also has these points of merit:

- **Price Change does not alter load on meter**
- **The Ferranti 100 amp. Micro-gap Switch**
- **Ease of collection**
- **Coin mechanism readily detachable**
- **Fixed charge collector mechanism**

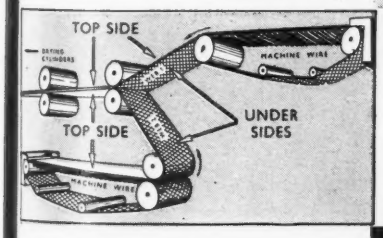
FERRANTI LTD · HOLLINWOOD · LANCS
LONDON OFFICE · KERN HOUSE · 36 KINGSWAY · WC2

FERRANTI

FM. 115.2



This photograph shows the two wet ends of one of the Tullis Russell Twin wire Paper making machines.



. . . we are exhibiting

INTERNATIONAL PRINTING MACHINERY AND ALLIED TRADES EXHIBITION

We shall be pleased to see you at

STAND No. 46

OUTER ROW, FIRST FLOOR, GRAND HALL

IPEX
OLYMPIA LONDON
5th-16th July 1955

LONDON 'Ivorex House' Upper Thames St., E.C.4

BIRMINGHAM 177 Corporation St

MANCHESTER 372 Corn Exchange Buildings Corporation St

SCOTLAND Auchmuty & Rothes Paper Mills Markinch, Fife

IVOREX • MELLOTEX • ARTINE • MANCHESTER CARTRIDGE • SORBEX BLOTTING AND TECHNICAL PAPERS FOR INDUSTRY

Tullis Russell & Co. Ltd.
ESTABLISHED 1809

THE PIONEERS OF TWIN WIRE PAPERS FOR PRINTERS

Keeping up our own standards

THE HIGH REGARD in which 'C.M.A.' cables are held all over the world has to be earned. In order to maintain these high standards a continuous quality check is operated by the Cable Makers Association.

Samples of electric cables are taken at random and stringently tested in the laboratory of another member. Reports are submitted . . . appropriate corrective action is taken where necessary; and because of this constant vigilance users are assured that the high quality of 'C.M.A.' cables is at all times maintained.

MEMBERS OF THE C.M.A.

British Insulated Callender's Cables Ltd · Connollys (Blackley) Ltd. The Craigpark Electric Cable Co. Ltd · Crompton Parkinson Ltd. The Edison Swan Electric Co. Ltd · Enfield Cables Ltd · W. T. Glover & Co. Ltd · Greengate & Irwell Rubber Co. Ltd · W. T. Henley's Telegraph Works Co. Ltd · Johnson & Phillips Ltd · The Liverpool Electric Cable Co. Ltd · Metropolitan Electric Cable & Construction Co. Ltd · Pirelli-General Cable Works Ltd. (The General Electric Co. Ltd) · St. Helens Cable and Rubber Co. Ltd · Siemens Brothers & Co. Ltd. (Siemens Electric Lamps & Supplies Ltd.) · Standard Telephones & Cables Ltd · The Telegraph Construction & Maintenance Co. Ltd.

The Roman Warrior and the letters 'C.M.A.' are British Registered Certification Trade Marks.

Visit us on Stand No. 52
British Electrical Power Convention June 27th—July 1st

CABLE MAKERS ASSOCIATION, 52-54 HIGH HOLBORN, LONDON, W.C.1. **Telephone : Holborn 7633**

CMA/2

The properties of Morganite

High resistance to wear

MORGANITE Carbon is manufactured in several strong robust grades having a high degree of resistance to abrasive wear even under extreme temperature conditions. Coupled with a power of self lubrication —unique to Carbon—this resistance to wear enables MORGANITE Carbon to be used against moving metal surfaces without danger of welding or seizure, in places where ordinary lubricants cannot be used. In MORGANITE the special properties of Carbon have been developed to such a high degree that this versatile material is now chosen to solve many of the problems of design engineers which have defied many other solutions.

Other properties include:

Wide range of resistance to chemical attack.
Machinability.
A range of thermal conductivity.
Not wetted by molten metal or slags.
Non-seizing.
Non-galling.
Good mechanical strength at high temperatures.
A range of electrical conductivity.
Available in impervious forms.
Low thermal expansion.

MORGANITE CARBON

Our technical staff can help you solve your problems

THE MORGAN CRUCIBLE COMPANY LIMITED BATTERSEA CHURCH ROAD LONDON S.W.11

Phone Battersea 8822. Grams CRUCIBLE LONDON TELEX

C.38

CIRSCALE

Recording & Measuring Instruments

One of a great variety of accurate indicating instruments specially designed to meet demands of this modern age

Rotary Synchroscopes
Wattmeters, Graphic Recorders
Switchboard and Portable Ammeters
Frequency and Power Factor Meters
"Shirley" Moisture Meters

RECORD

Current Transformers
Voltmeters, Protective Relays
Insulation and Resistance Testers
"Cirscale" Electric Tachometers
"Shirley" Static Eliminators

Pioneers of the circular scale

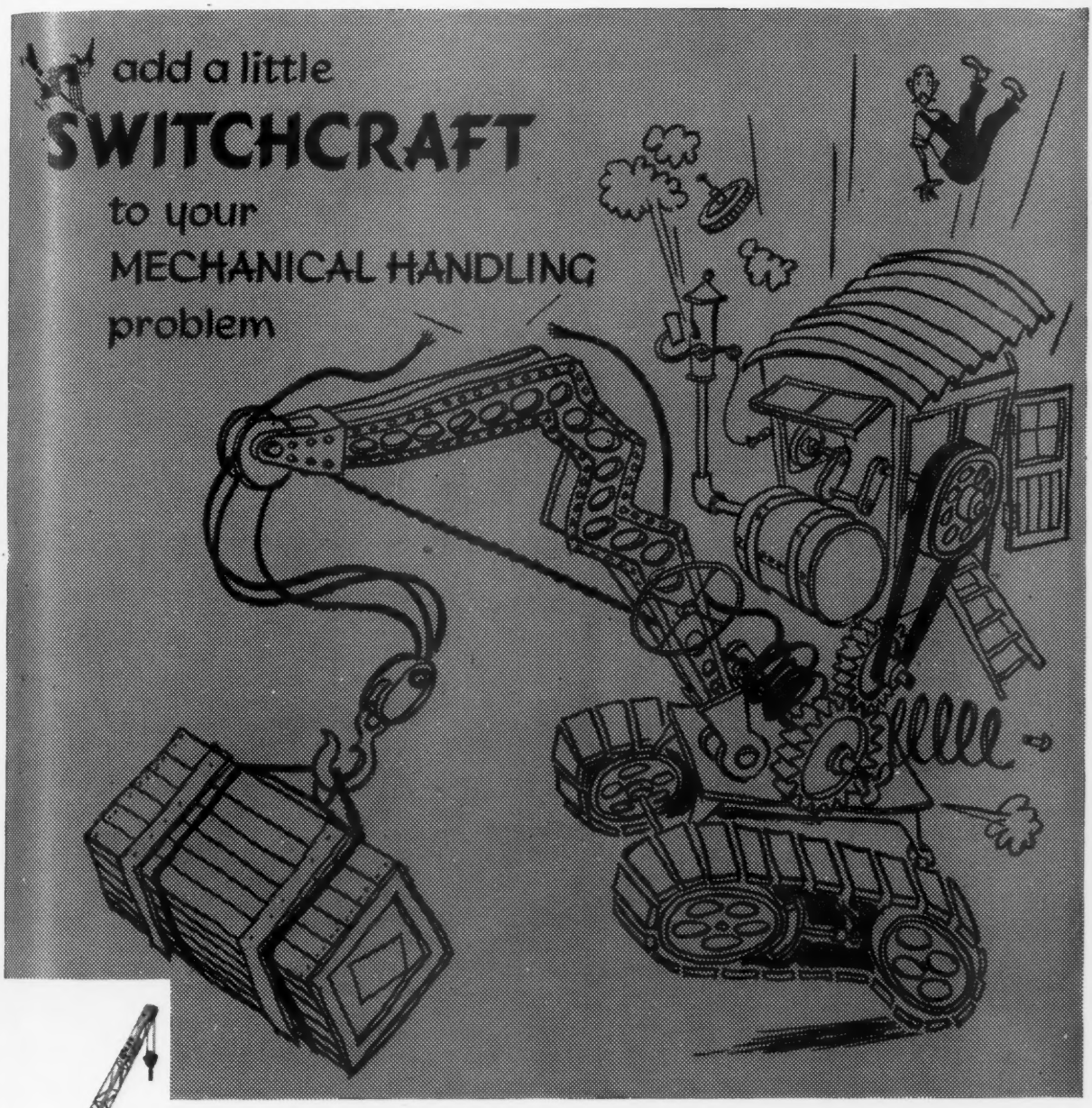
THE RECORD ELECTRICAL CO. LTD

BROADHEATH · ALTRINCHAM · CHESHIRE

You will be welcome at our Stand No. 14, Block E, British Instrument Industries' Exhibition, Earls Court, 28th June to 9th July

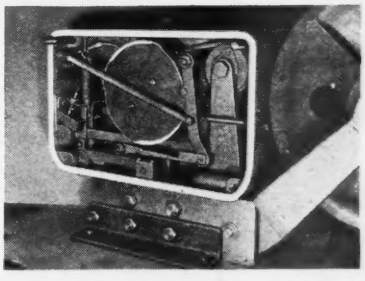
C 4003

add a little
SWITCHCRAFT
to your
MECHANICAL HANDLING
problem



BURGESS MICRO-SWITCHES are used in manifold ways by a large number of Manufacturers of Mechanical Handling equipment. A good example is to be found in the Automatic Safe Load Indicator Mk. 3 here illustrated (with front cover removed) which is fitted by Steels Engineering Products Limited to many of their 'Coles' mobile cranes.

This ingenious unit safeguards both operator and machine by "cutting-out" the hoisting and derricking-out motions when a load becomes unsafe. It also provides warning of the approaching "cut-out" position so that the operator may ascertain the maximum safe radius of the derrick for the respective load. These facilities are provided by type CRS BURGESS MICRO-SWITCHES mounted in the unit and operated by levers in the manner evident from the photograph.



The type CRS BURGESS MICRO-SWITCH is a sensitive model provided with a spring plunger actuator. Full details of this and many other models are to be found in our CATALOGUE No. 50/C.

BURGESS MICRO-SWITCHES
Industry's Automatic Choice

BURGESS PRODUCTS COMPANY LIMITED
Micro-Switch Division, Dukes Way, Team Valley, Gateshead 11. Tel. : Low Fell 75322 (3 lines)

QUICKER COOKING

The new Redring Boiler-Griller is the biggest advance in electric cooking since the introduction of the radiant plate. Specially designed to give high performance for both boiling and grilling, its revolutionary two-level element gives it approximately twice the boiling efficiency of any other dual purpose device—plus more evenly distributed heat for grilling and toasting. Boiling performance is unaffected when grilling is being carried on, and vice versa.

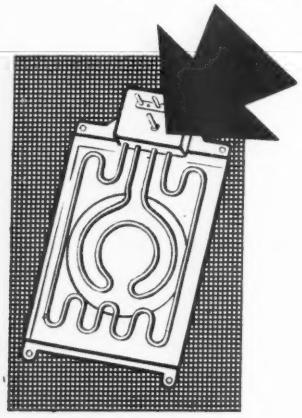
New

REDRING Boiler - Griller

The centre element is at hob level *for faster boiling, while the lower element ensures maximum heat density at outer edges of grill where heat loss is usually greatest.*

QUICKER BOILING... MORE EVEN GRILLING

Other outstanding features —



- Robust sheathed element quickly glows red-hot
- Economical performance. Total loading 2.5 kW. Boiling only 1 kW.
- Fits all modern cookers.
- No ceramic base to crack or chip.
- Does not require special vessels.
- Reflector not essential.

Send for further particulars to :

METROPOLITAN-VICKERS
ELECTRICAL CO LTD · TRAFFORD PARK · MANCHESTER, 17

Member of the A.E.I. group of companies.

See our Stand No. 45 at the B.E.P.C. Exhibition Brighton, June 27 - July 1

LH 502

Type Gb. 509, 25 ft. M.H. for Group 'A' roads.

(Above) Type Gb. 811, 15 ft. M.H. for Group 'B' roads.

(Right) Type Gb. 588, 25 ft. M.H. for Group 'A' roads.

TUBULAR STEEL STREET LIGHTING COLUMNS

This is one of a series of advertisements illustrating our range of standard tubular steel lighting columns approved by the Council of Industrial Design. Other designs, plain or fluted, for 13 ft., 15 ft., and 25 ft. mounting heights, will appear from time to time. A folder showing our standard columns will be sent on application.

STEWARTS AND LLOYDS LIMITED

GLASGOW · BIRMINGHAM · LONDON

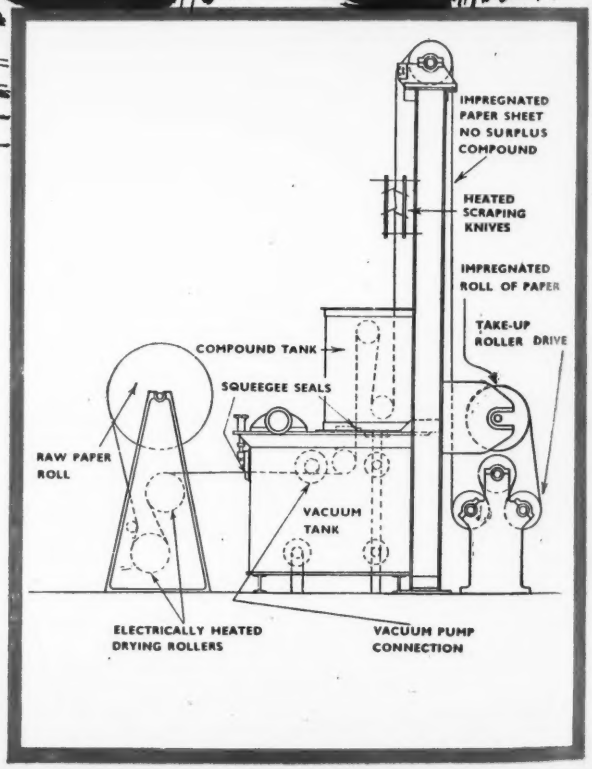
The largest manufacturers of steel tubes in Europe

S&L

"SO YOU SEE CHAPS"–

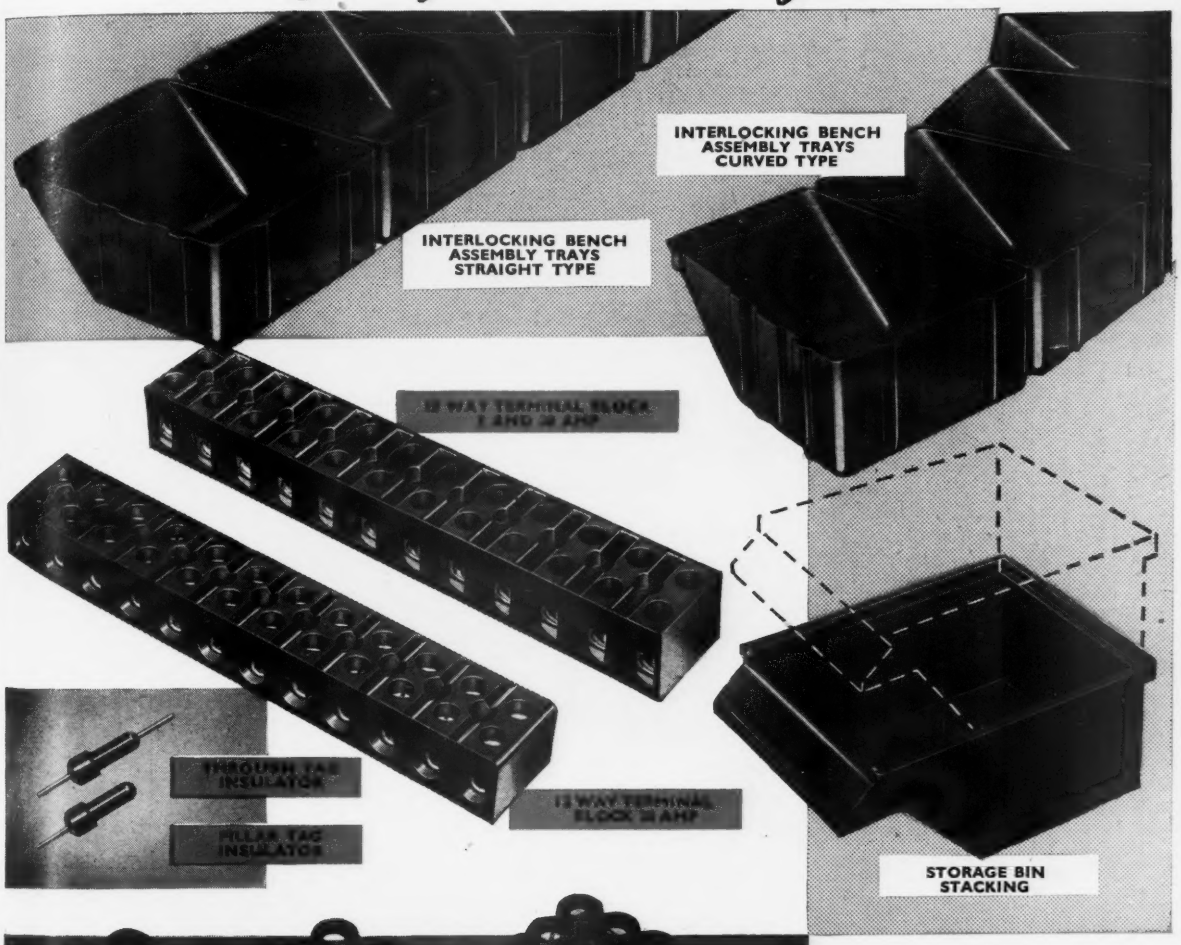
"In the Glover method the paper is impregnated in sheet form with a high grade compound on special pre-impregnating machines . . ."

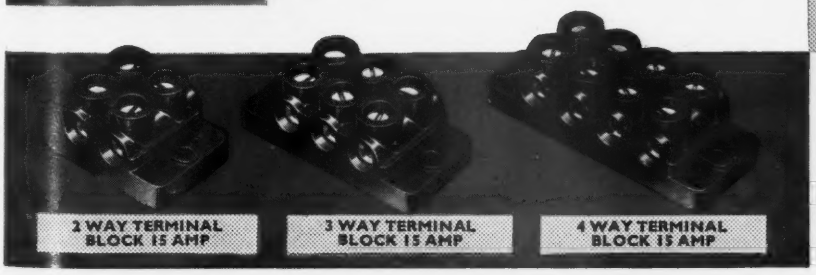
But has it occurred to you that Glovers pre-impregnated paper insulated cables are INHERENTLY NON-DRAINING and can be installed in any position, with the assurance that compound migration is eliminated.



W. T. GLOVER & CO. LTD.
MEMBERS OF THE C·M·A
TRAFFORD PARK MANCHESTER 17
TRAFFORD PARK 2141

Supplying Industry's Needs


INTERLOCKING BENCH ASSEMBLY TRAYS CURVED TYPE
INTERLOCKING BENCH ASSEMBLY TRAYS STRAIGHT TYPE
STORAGE BIN STACKING



Insulators Limited manufacture all types of plastic mouldings using compression and injection techniques to customers specifications.

Illustrated above is a selection of compression mouldings all produced in phenolic materials. Please write or telephone your enquiries to our head office.

Insulators Ltd

Mouldings of Merit

INSULATORS LTD., LEOPOLD ROAD, ANGEL ROAD, EDMONTON, LONDON, N.18
BRANCH FACTORIES: JARROW, DURHAM & PADDOCK WOOD, KENT.
Telephone: Edmonton 1491 *Telegrams: Mermould, Southtot, London*

Flying Repairs. Repairs from overseas are not infrequent at the house of Collins. The above photograph shows two rotors, which had just arrived by air from the Middle East, being unpacked. A few days later they were again in B.O.A.C.'s charge on their urgent way back to another satisfied customer.

COLLINS

Collins Electrical Ltd.

Head Office 115 *Clerkenwell Road London EC* 1

Central London Works

22 *St. Albans Place Upper Street Islington N* 1

West London Works

9 *&* 11 *Featherstone Road Southall*

Phone Holborn 0212-4 *Canonbury* 3227-8

or Southall 0168

Smith for accuracy

✳

TYPE AM SINGLE PHASE METER

Sturdily built for trouble-free service under all conditions, the Smith Type AM Single Phase domestic meter is a fine example of precision engineering. It has the remarkable range of accuracy of 60/1, which is achieved without any sacrifice of the torque at light load. This, together with the rigidity and sureness of response of the light load adjustment, constitutes the finest proof of the stability of the meter as a whole. This model also features:

- ✳ **Single laminated construction throughout.**
- ✳ **Strong magnets** *made from the new material Alcomax II (an Anisotropic product made by the Permanent Magnet Association.)*
- ✳ **White translucent plastic base** *for easier cleaning and maintenance.*

SOME TECHNICAL DATA

Maximum continuous ratings: 10, 40 and 80 amperes. Torque at maximum load: 12.5 gr. cms. Losses in Shunt Coils: 1.2 watts—4.3 VA. Losses in Series Coils: 2.8 watts — 3 VA. Rotor speed at maximum load: 48 r.p.m. Temperature Coeff. Unity and Power Factor Load: 0.02% deg. C.

SMITH METERS

SMITH METERS LTD • ROWAN ROAD • STREATHAM VALE • LONDON SW16

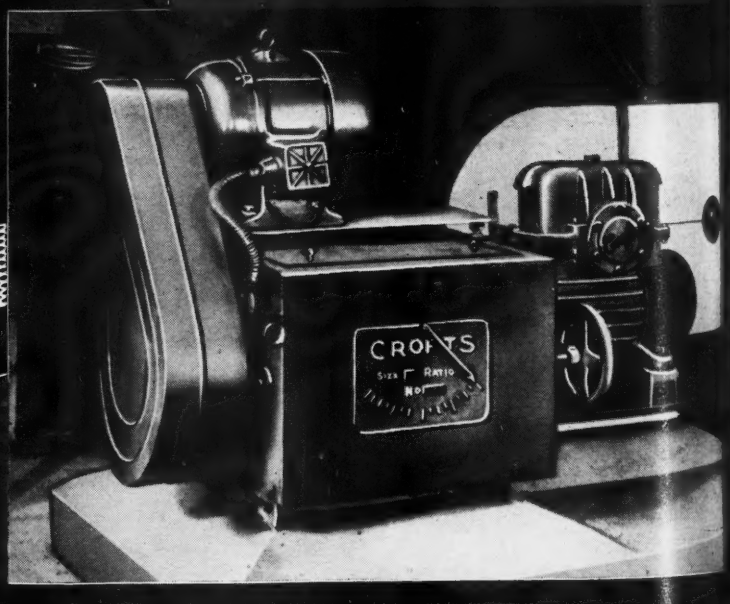
Telephone: POLlards 2271

Crofts

VARIABLE SPEED GEARS

A simple and effective means of obtaining infinite speed variation of running machinery. Vertical and horizontal units available in either our "Klosed" or open type gears with powers up to 130 H.P. and ratios up to 16—1. Units can be adapted for floor, ceiling or wall mounting with either handwheel push button or fully automatic control

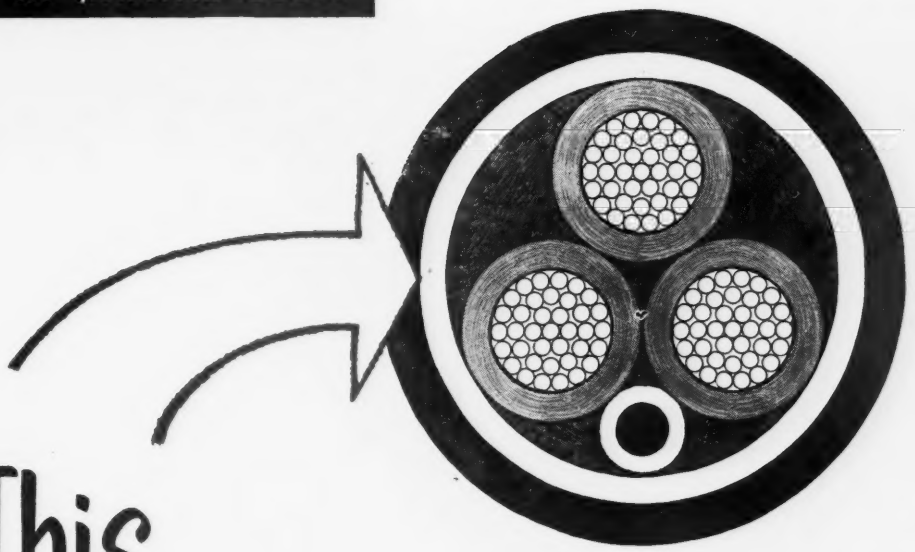
WRITE FOR PUBLICATION 25/9



Crofts

1408

ECONOMY IN CAPITAL COSTS



This Aluminium Sheath...

performs the functions of a normal lead sheath PLUS a reinforcement against the internal gas pressure, and a mechanical protection — providing economy in materials and lightness in construction.

SOME TYPICAL INSTALLATIONS

London Electricity Board
10,690 yards laid between Perth Road Sub-Station and Buckhurst Hill Sub-Station.

Midlands Electricity Board
9,310 yards laid between Halford Lane Sub-Station and Handsworth and Freeth Street Sub-Station, Birmingham.

South East Scotland Electricity Board
Contract placed for 6,120 yards to be laid between Townhill Power Station and Netherton Sub-Station, Fifeshire.

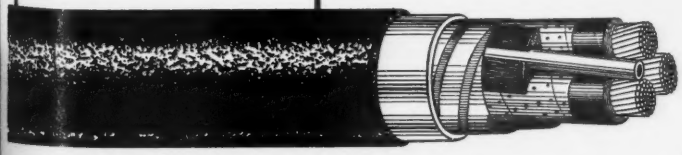
Brisbane City Council
Order in hand for 31 miles to be delivered to Australia.

Aluminium Sheathing is a notable advance in pressure cable manufacture.

Elimination of a separate reinforcement simplifies jointing, while the lighter weight makes the cable more convenient to handle, reducing transport and installation costs to a minimum.

Because of this, BICC 33kV Aluminium Sheathed Impregnated Pressure Cable can offer a saving of up to 25% in initial costs compared with solid types.

Further information is available on request.



BICC

33 kV

ALUMINIUM SHEATHED I.P. CABLE

Branches and Agents throughout the World

BRITISH INSULATED CALLENDER'S CABLES LIMITED, 21 BLOOMSBURY STREET, LONDON, W.C.1

BI Callender's

ASTA certified

The Association of Short Circuit Testing Authorities (ASTA) issues Certificates of Rating for fuses giving satisfactory performance when tested in accordance with the appropriate clauses of British Standard 88.

The complete range of 'ENGLISH ELECTRIC' Type 'T' High Rupturing Capacity Non-Deteriorating Cartridge Fuse Links has been A S T A certified for Category of Duty 440AC4 to the 1939 edition of B.S.88 (the highest category at that time) and for Categories of Duty 440AC4 and 440AC5 representing 25MVA and 35MVA respectively to the 1947 edition of B.S.88.

RATING AMPS.	LIST NOS.	ASTA CERTIFICATE NUMBERS		
		B.S.88: 1939	B.S.88: 1947	
		440 AC 4	440 AC 4	440 AC 5
30	T1A30	617	1016	2074
60	T1S60	616	903	2022
100	TC100	615	932	2021
200	TF200	251	933	2033
300	TKF300	252	934	2032
400	TM400	629	935	2031
500	TT500	354	936	2025
800	TLT800	353	2098	2026

'ENGLISH ELECTRIC'

h.r.c. fuse links

See also our Steam Turbines and "Meters, Relays and Instruments" advertisements in this issue

THE ENGLISH ELECTRIC COMPANY LIMITED, QUEENS HOUSE, KINGSWAY, LONDON, W.C.2

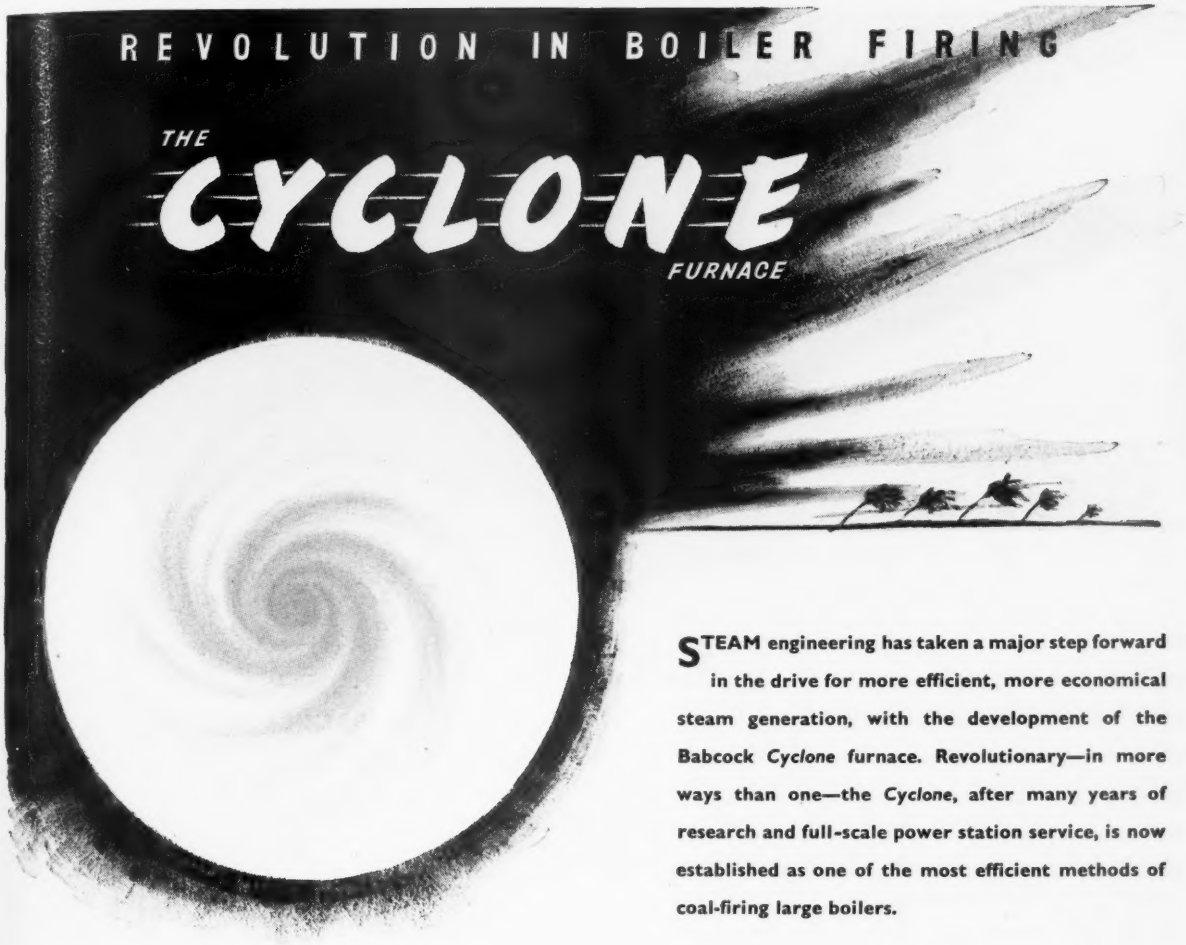
Fusegear Works, East Lancashire Road, Liverpool, 10

WORKS: STAFFORD · PRESTON · RUGBY · BRADFORD · LIVERPOOL · ACCRINGTON

FG.7

REVOLUTION IN BOILER FIRING

THE CYCLONE FURNACE



STEAM engineering has taken a major step forward in the drive for more efficient, more economical steam generation, with the development of the Babcock *Cyclone* furnace. Revolutionary—in more ways than one—the *Cyclone*, after many years of research and full-scale power station service, is now established as one of the most efficient methods of coal-firing large boilers.

THE CYCLONE FURNACE burns even poor-grade coals at high combustion rates, with low excess air and high ash recovery.

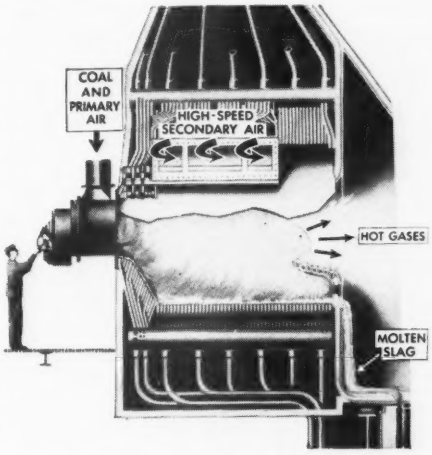
Enormously reduces fly-ash passing through the boiler, greatly simplifying the problem of ash and dust collection and stack emission. The *Cyclone* converts the ash to molten slag which is quenched and easily disposed of.

Achieves high boiler efficiency due to operation with low excess air, high heat absorption because of cleaner surfaces, negligible loss of unburnt combustible and lower power consumption for coal preparation—since the coal need only be crushed or coursely pulverized.

Increases "availability" of the boiler, because it greatly reduces slagging and deposits on the boiler surfaces and removes various major causes of heavy maintenance and shut-down.

Enables greater evaporative capacity to be obtained in less total space. Smaller boilers, with less ash and dust-collecting plant and other auxiliaries, can be housed in less costly buildings.

Ideally suited to simple, automatic combustion control.



Safe in operation. Easily started-up. Ignition stable under all load conditions.

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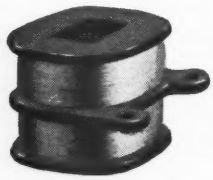

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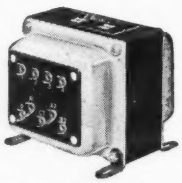

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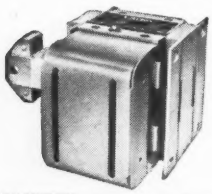

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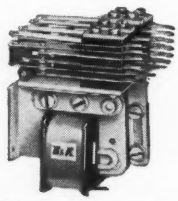

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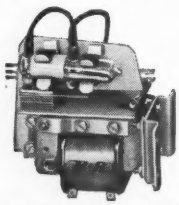

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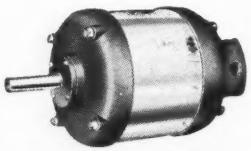

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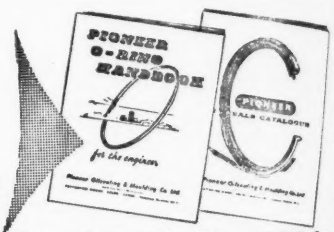

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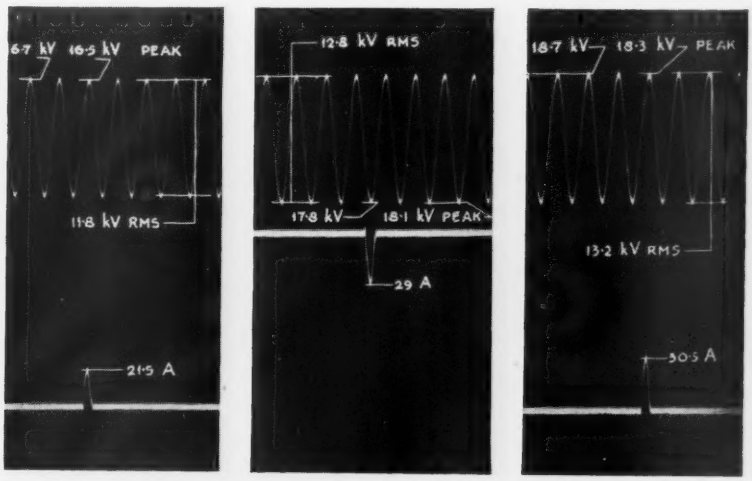

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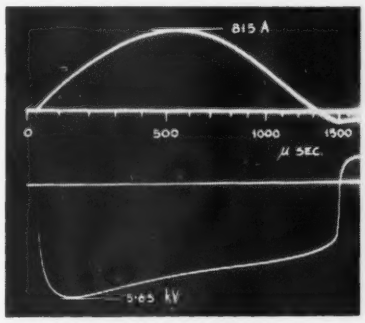

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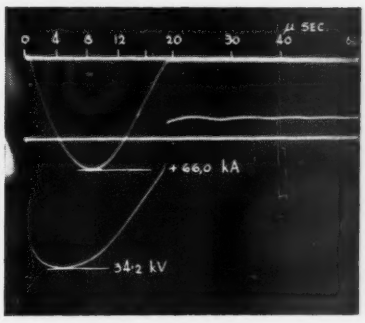

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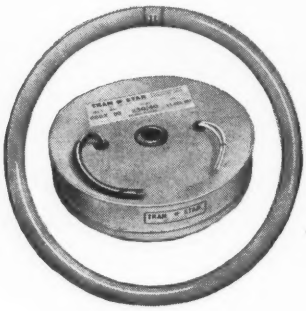

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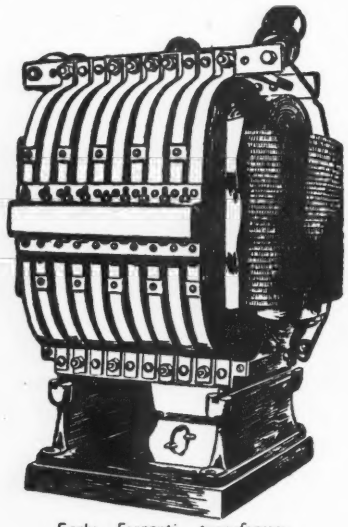

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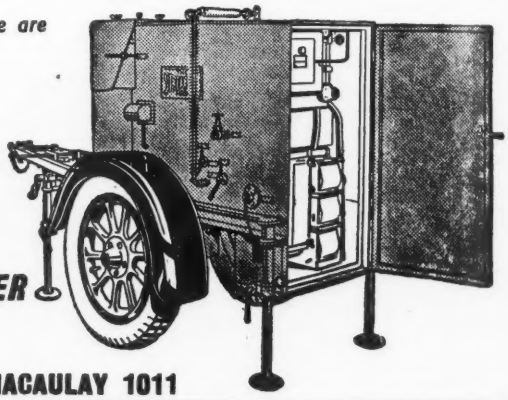

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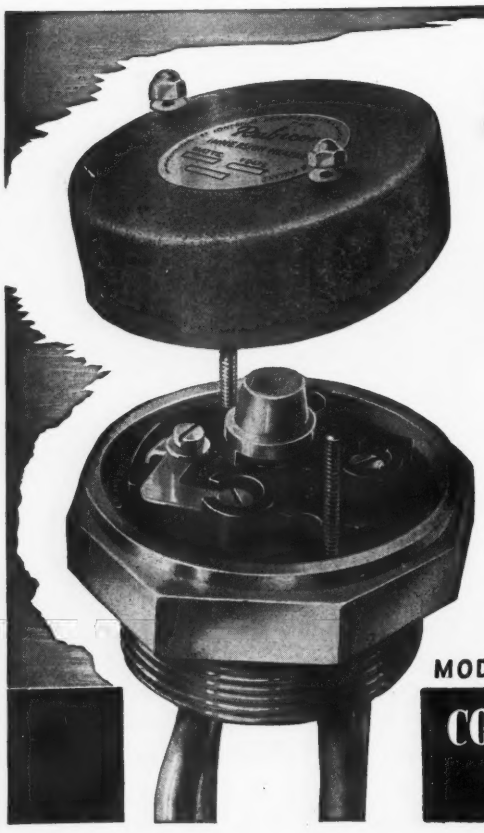

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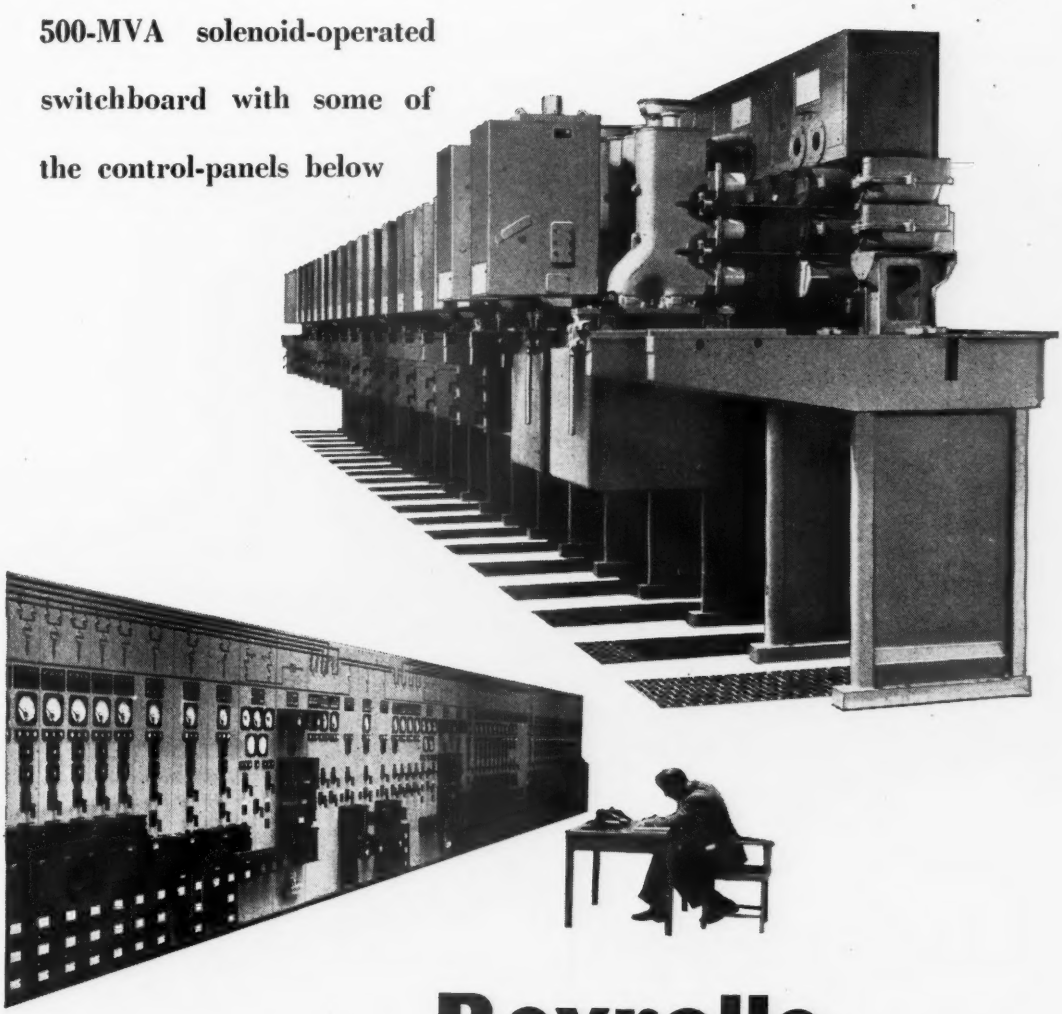

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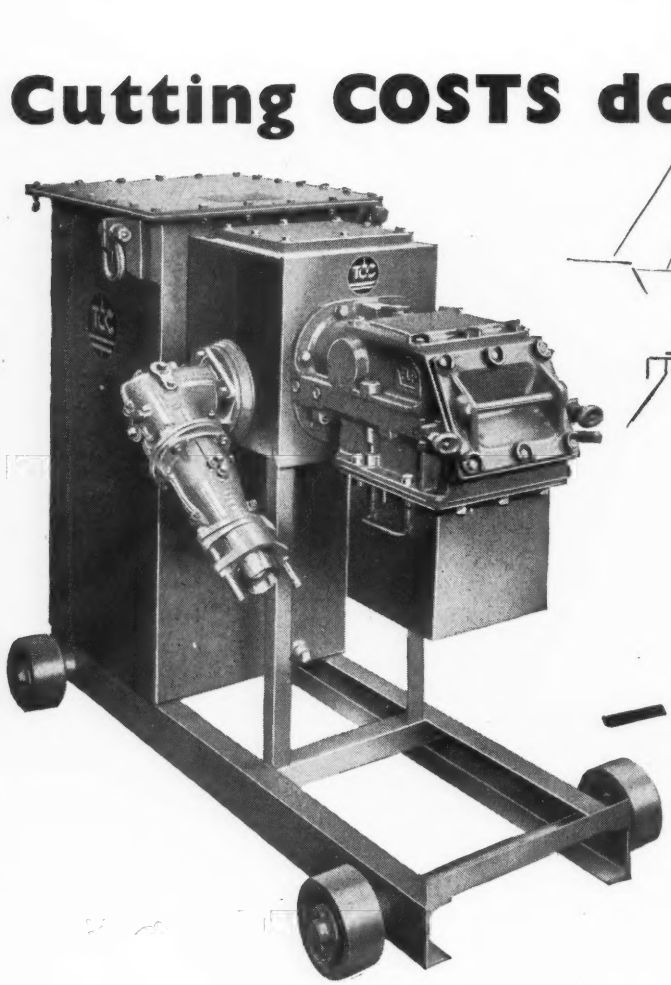

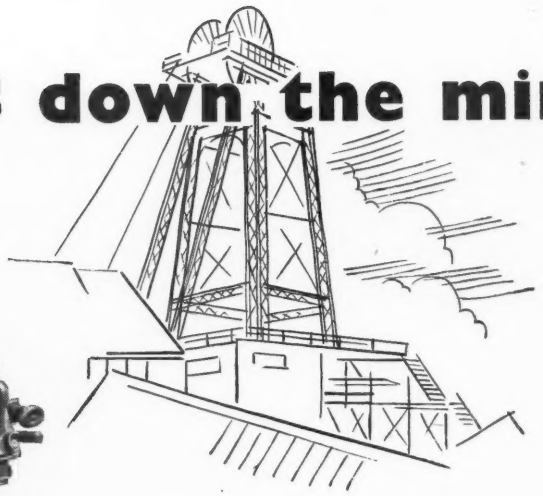

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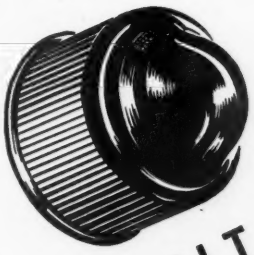

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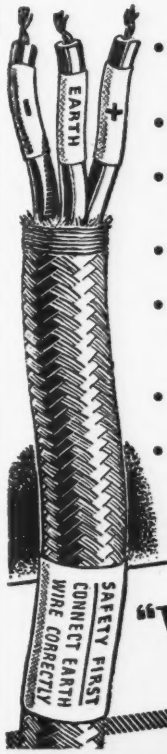

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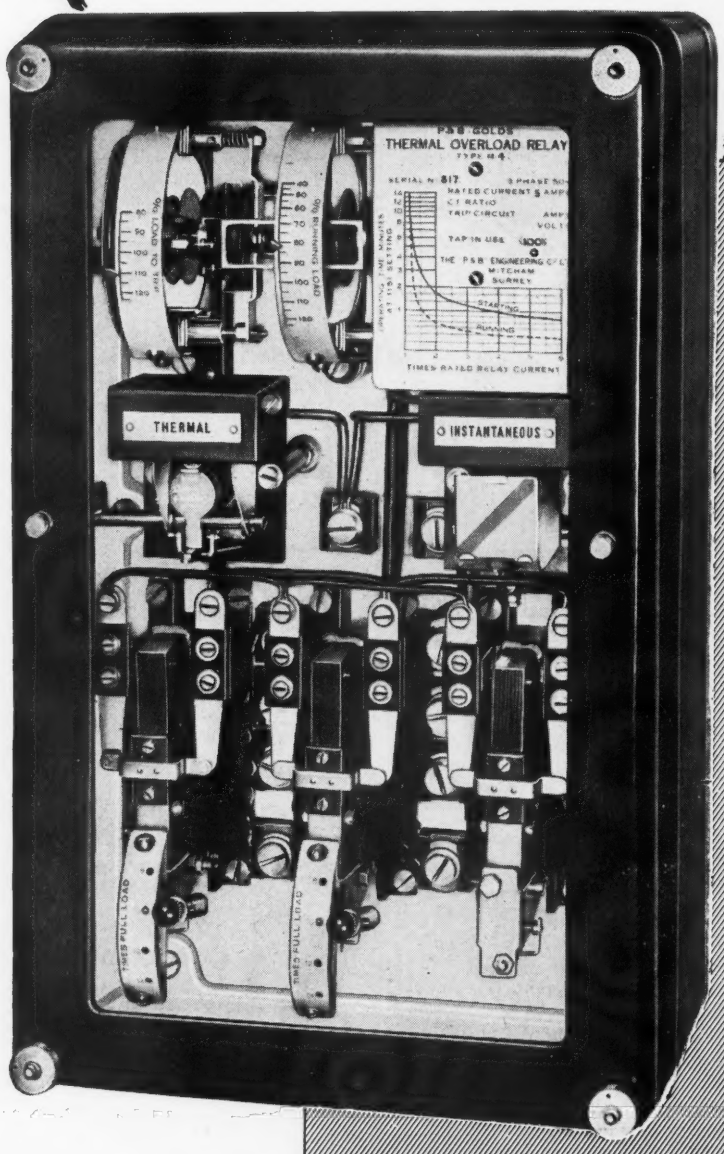

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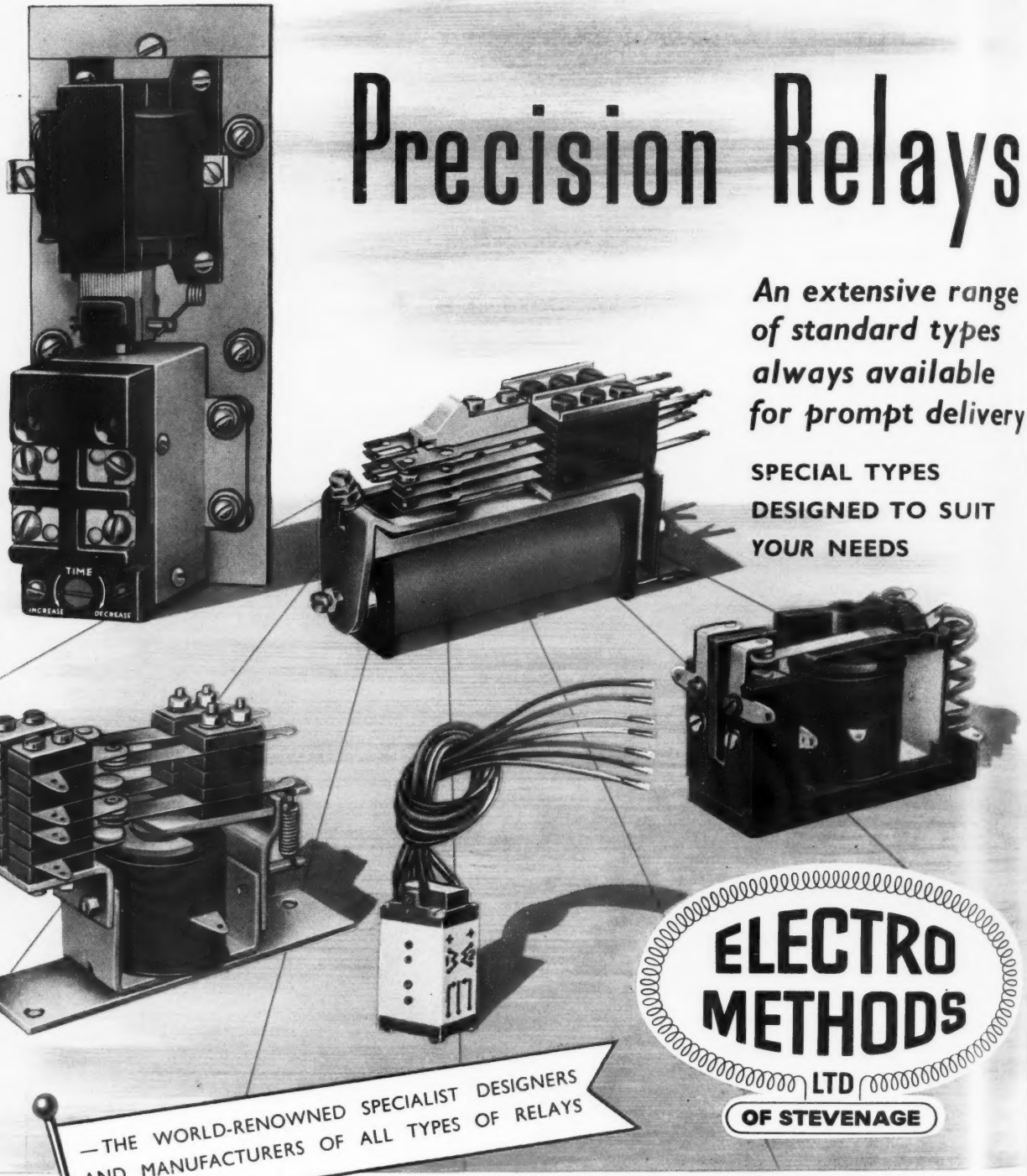

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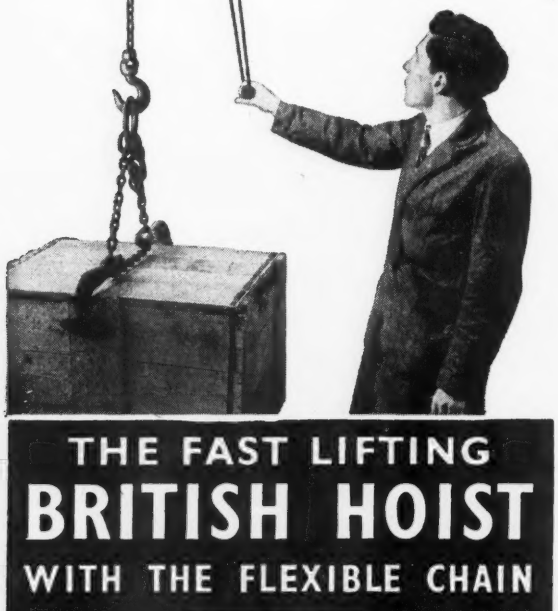

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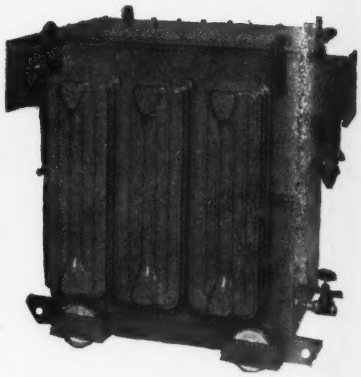

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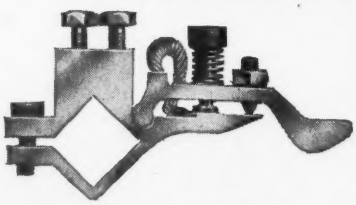

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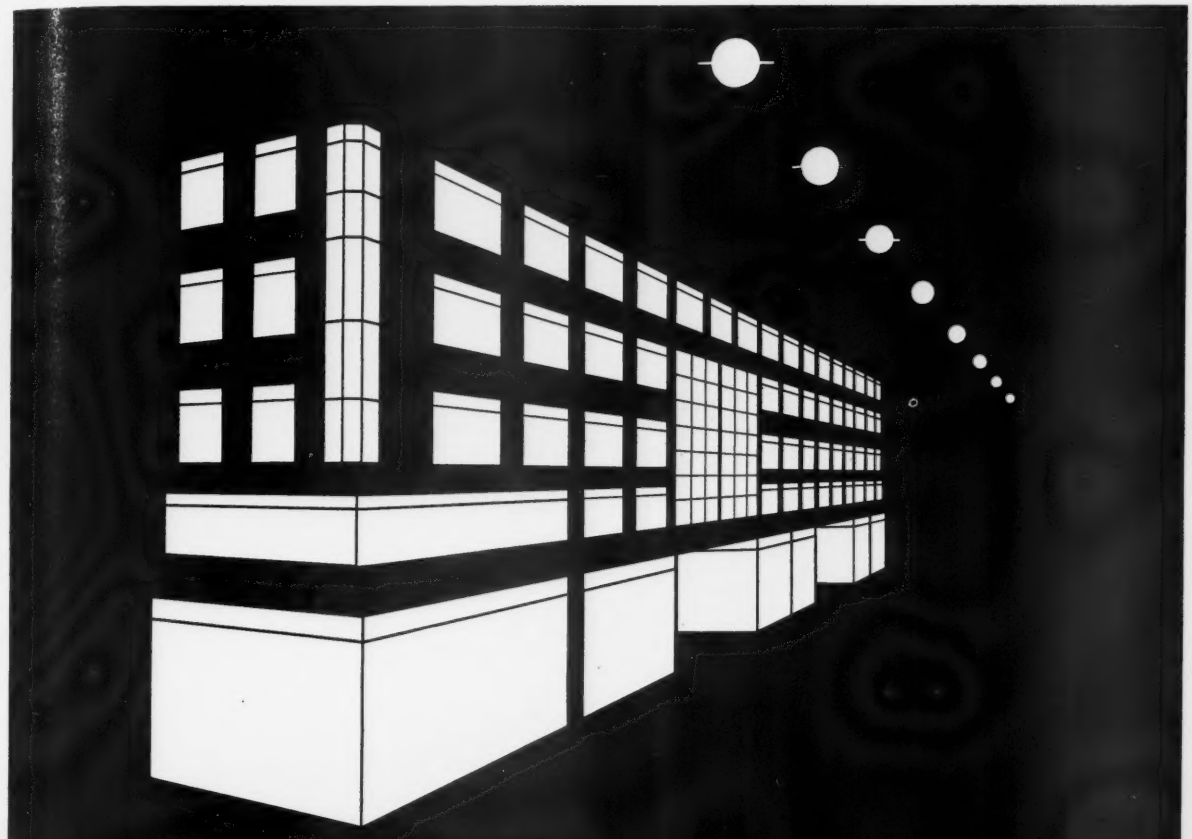

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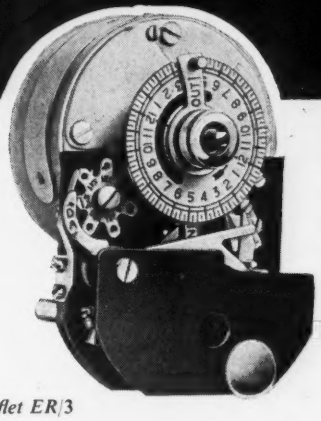

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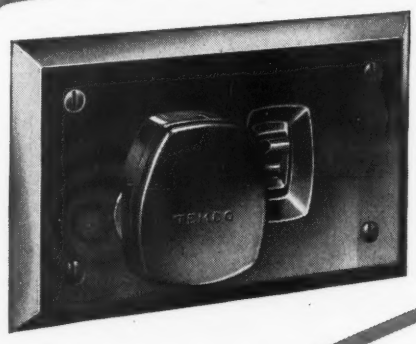
TEMCO A.C. Switch Sockets are small, attractive and individually packed. They conform to British Standards and I.E.E. Wiring Regulations.



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Easy wiring is a notable feature of the new TEMCO A.C. Switch Sockets and Plugs. Heat Resistant Back Plates for the Surface Types are available to form an enclosure for the Cable Sheath.

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You can confidently use TEMCO accessories even if low initial cost is important. Despite their high quality they are not expensive — proving that the best is really the cheapest.

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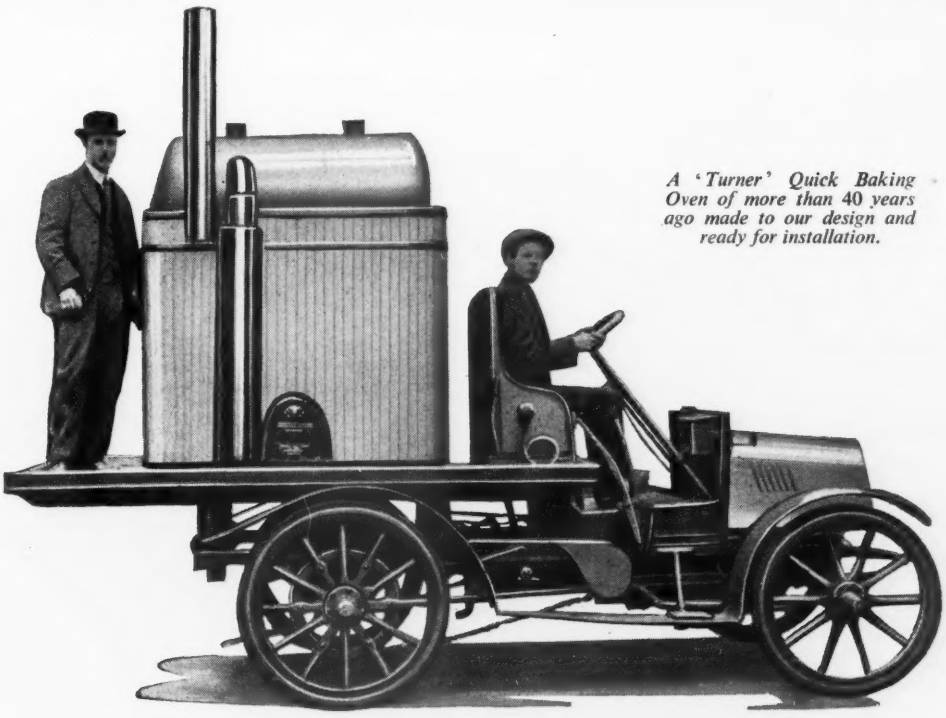

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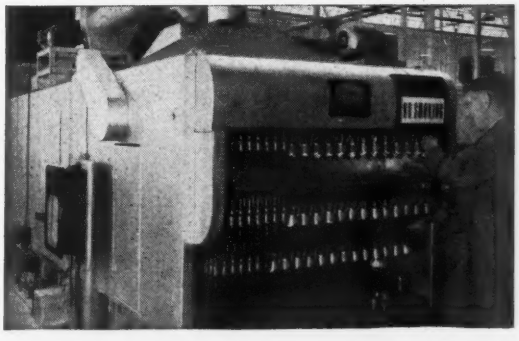

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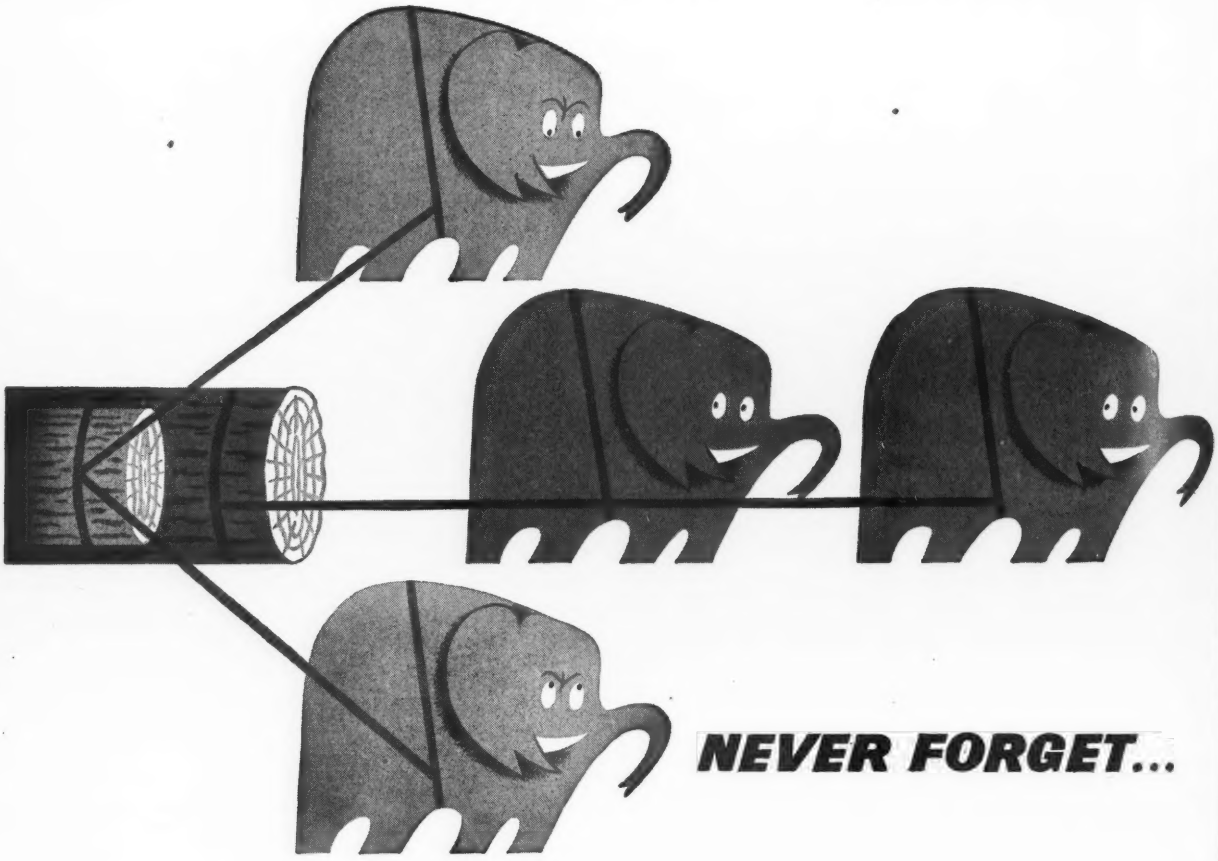

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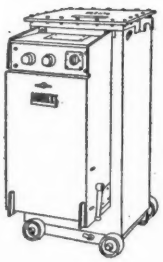

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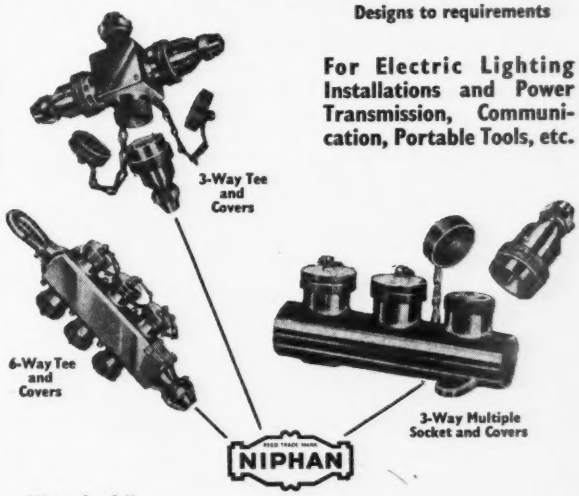

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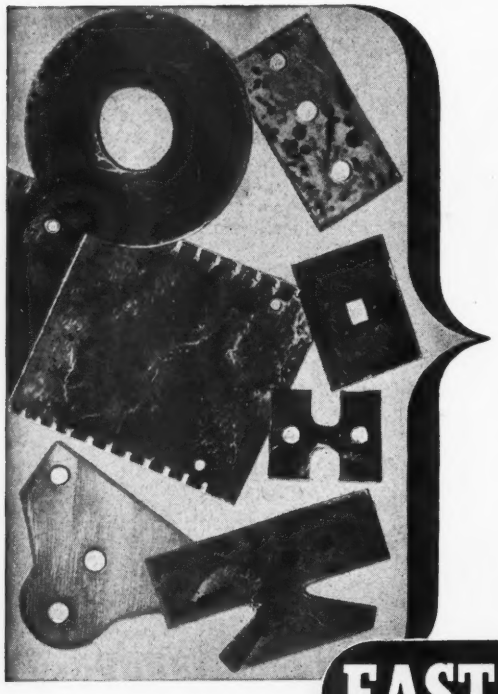

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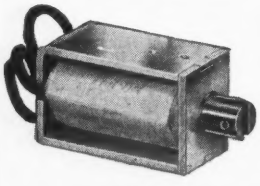

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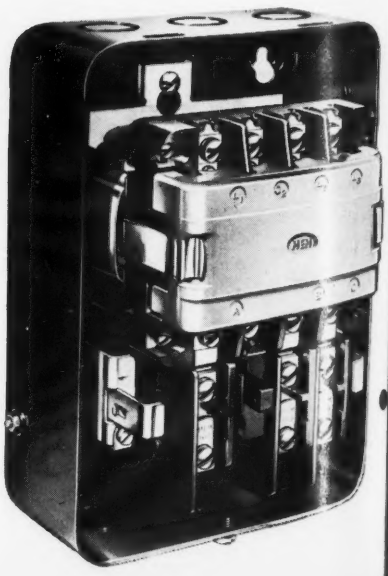

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at the

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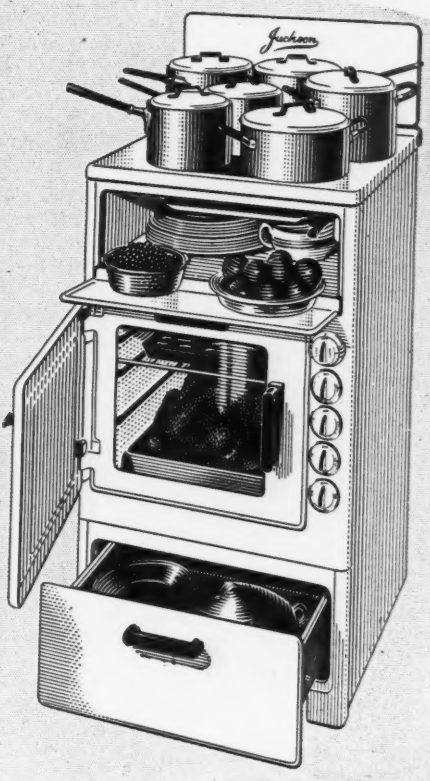

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G.E.C. STREET LIGHTING IN BLACKBURN

This lighting scheme for the Boulevard, an open area in front of Blackburn railway station, represents a two-fold achievement by The General Electric Co. Ltd.

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A recently developed fluorescent coating in these new lamps gives a striking improvement in colour-rendering properties, and opens new fields of application.

G.E.C. Aeroscreened Lanterns, in which all light is emitted below the horizontal are an ideal choice for space lighting of this kind.

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your car has NYLONS, too

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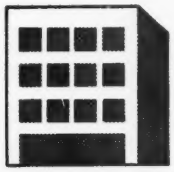
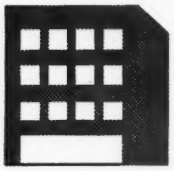
Radiovisor lighting control units operate irrespective of time and are controlled entirely by daylight intensity. This means that you are using artificial lighting *only* when it is required.



AUTOMATIC LIGHTING CONTROL UNIT MARK X. Designed chiefly for use with external artificial lighting, this unit is ideal for controlling the lighting of factory and railway goods yards, etc.; streets, bollard and traffic signs.



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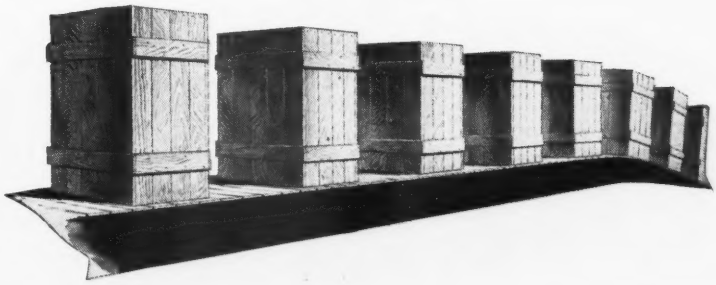

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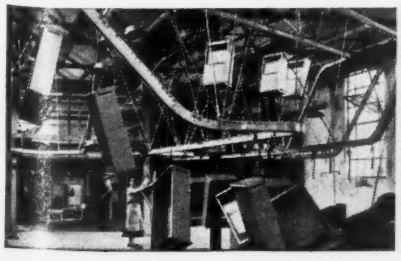

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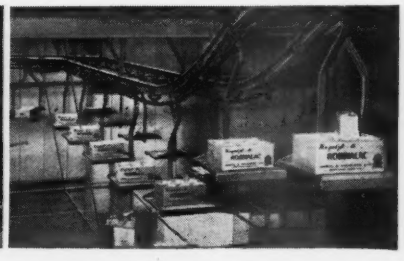

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WITHIN RANGE OF 8½ TO 55 K.W.

TABLE OF RATINGS AND CAPACITIES:

ENGINE		P3 (I)	P4 (I)	L4 (I)	P6 (I)	S6 (I)
GENERATOR EFFICIENCY		80%	81%	83%	84%	85%
SPEED OF ENGINE	CURRENT					
1000 r.p.m.	50c A.C. or D.C.	8½ k.w.	12½ k.w.	18 k.w.	20 k.w.	30 k.w.
1200 r.p.m.	60c A.C. or D.C.	10 k.w.	15 k.w.	22 k.w.	24 k.w.	37½ k.w.
1500 r.p.m.	55c A.C. or D.C.	13 k.w.	18½ k.w.	27 k.w.	30 k.w.	45 k.w.
1800 r.p.m.	60c A.C. or D.C.	15½ k.w.	21½ k.w.	30 k.w.	35 k.w.	55 k.w.

K.W. outputs are for 12-hour continuous operation at altitudes not exceeding 500 feet and ambient temperature of 85° F. For 24-hour continuous operation they should be reduced by 10%, also by 2% for every 10°F. by which the ambient temperature exceeds 85°F., and by a further 4% for every 1,000 feet above 500 feet. When generator efficiency varies from above, capacity should be adjusted to suit. Specification details of engine sent on request.

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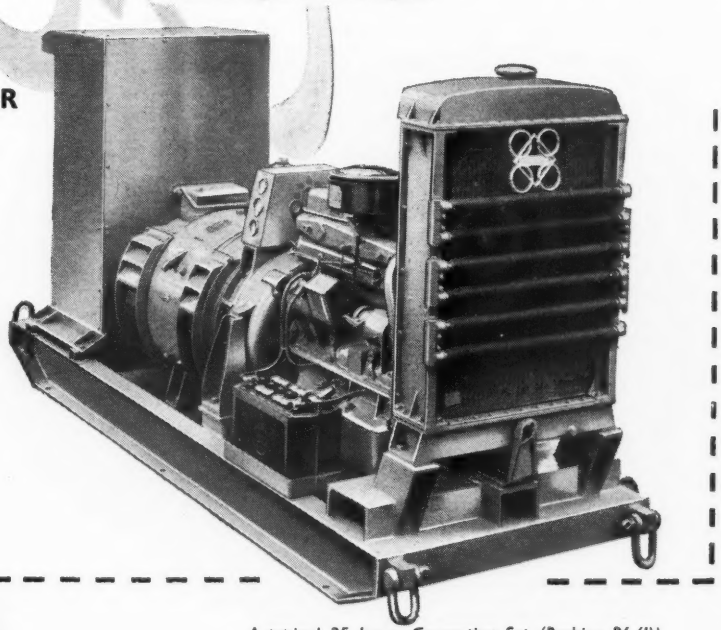

A typical 25 k.v.a. Generating Set (Perkins P6 (I)). (203/120 volts A.C., 3 phase, 4 wire, 60 cycles).

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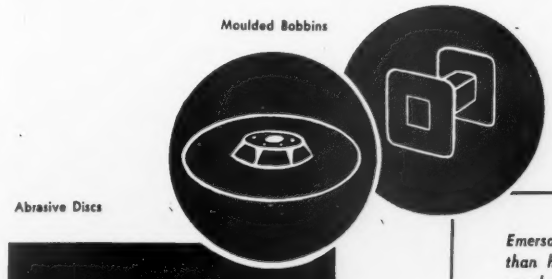
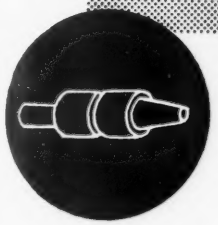


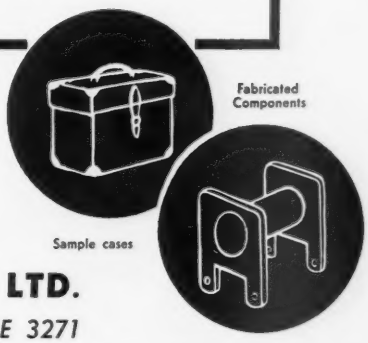
At your service....

Emerson once said, "If a man build a better mousetrap than his neighbour, even though he live in the heart of a wood, the world will tread a pathway to his door."

We don't build mousetraps, but Emerson's words apply with equal force to "Delanco" materials. "Delanco" Electrical Insulating Components are used extensively and are manufactured from only the best materials. Special components are also made to customers' original drawings to meet individual requirements.



Full technical data and assistance are available from our staff, who are at your service to give advice in the selection of the correct material for your particular work. Consult us today.



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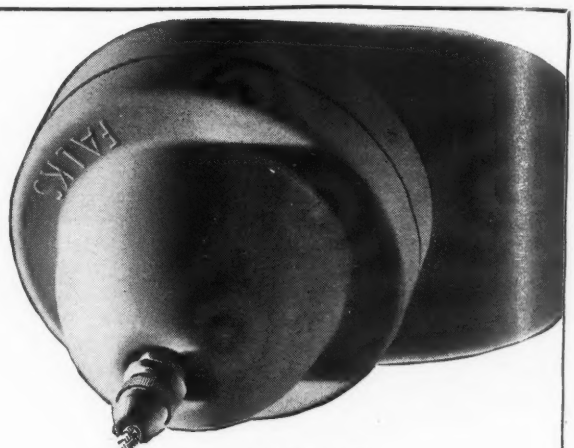
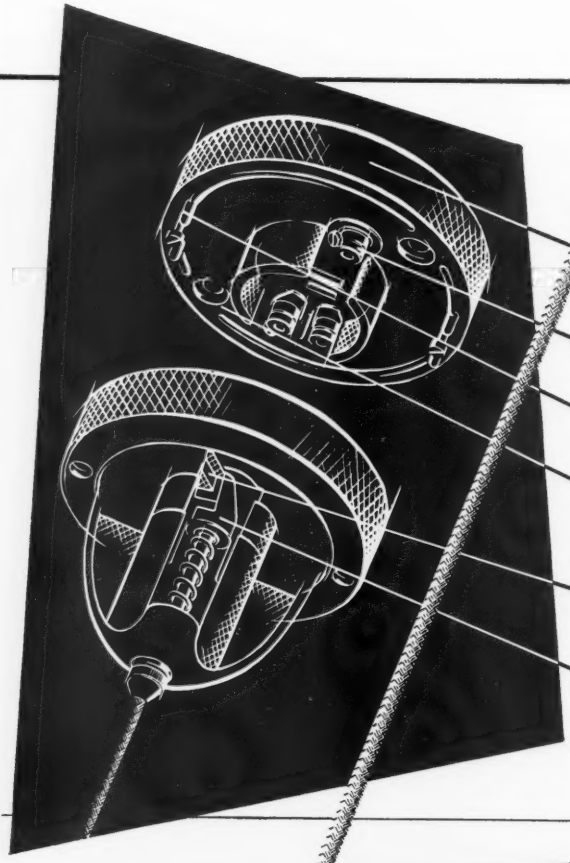


A new 'ROLAC' 2" centre fixing ceiling switch



That this switch is an advance on previous designs is clearly evident from the diagram. The electrical efficiency and workmanship are of the highest order and ensure long life.

Ample wiring space under the switch-base with knockouts opening into switch interior enables easy compliance with 12th Edition Wiring Regulations.

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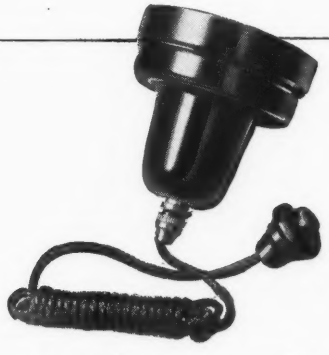

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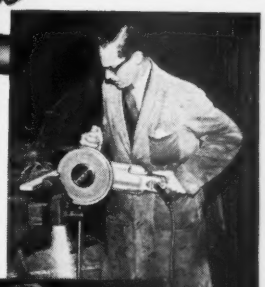

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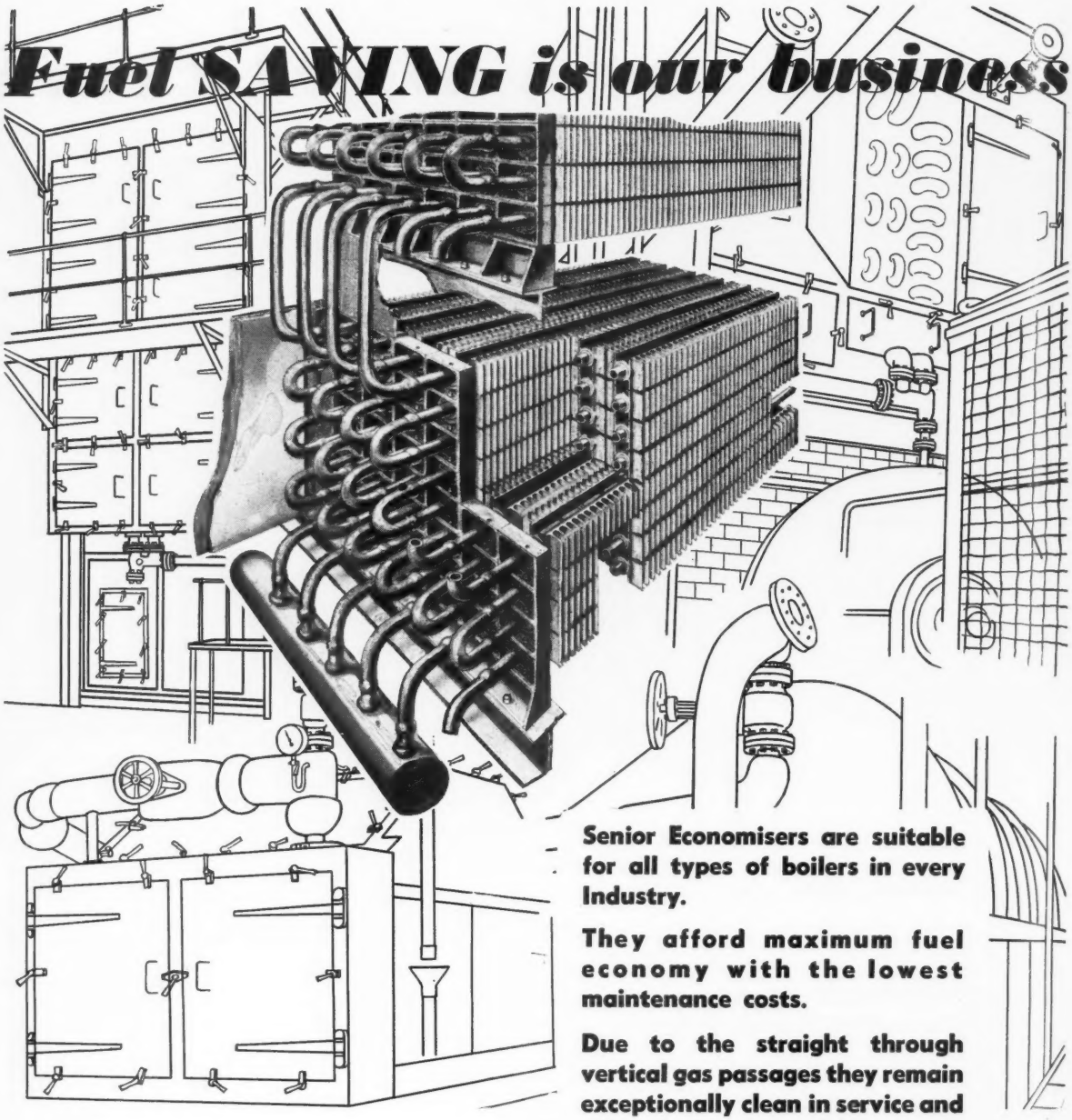

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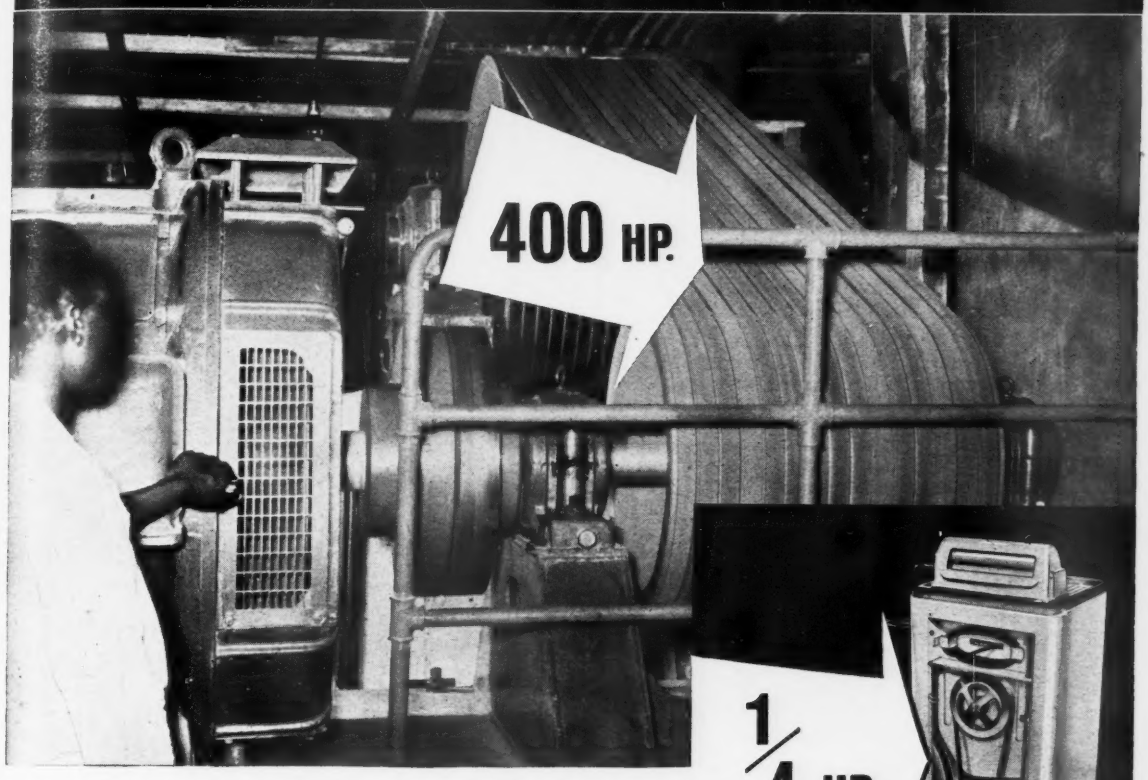

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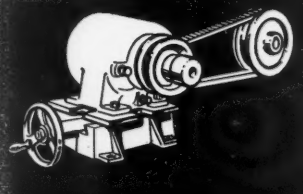

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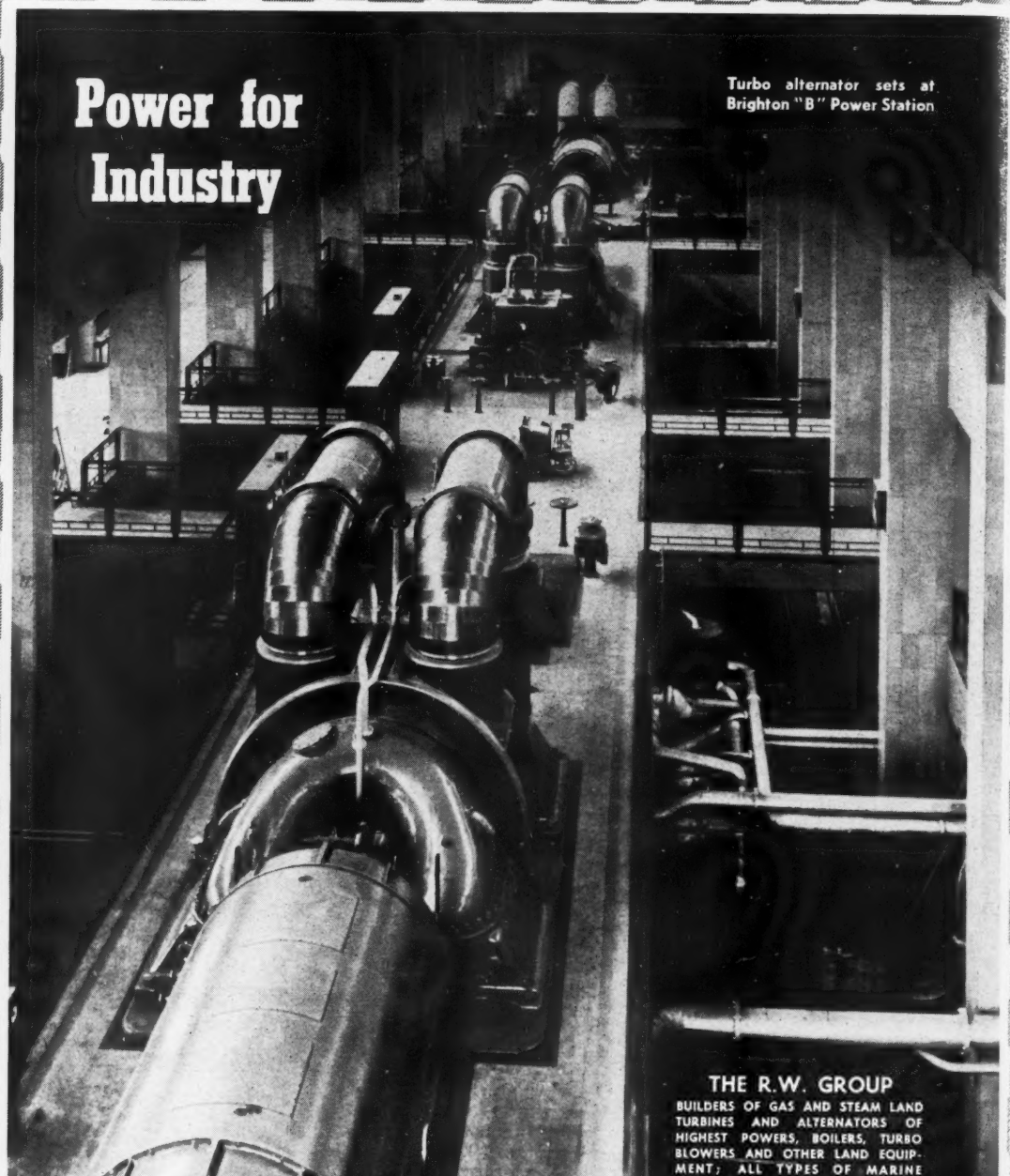

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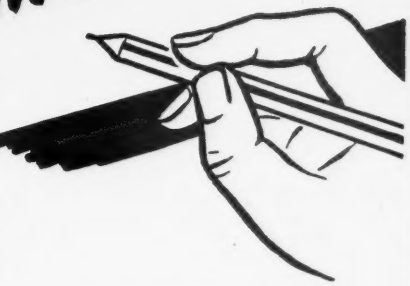

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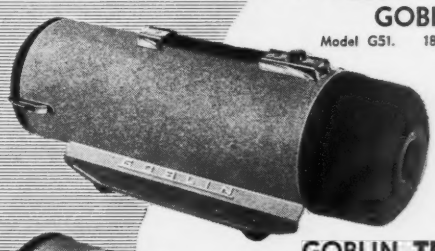

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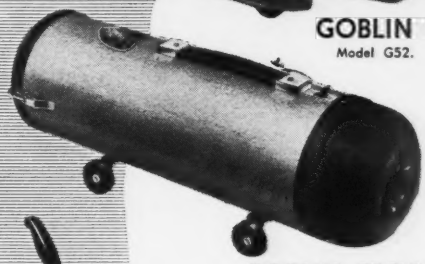

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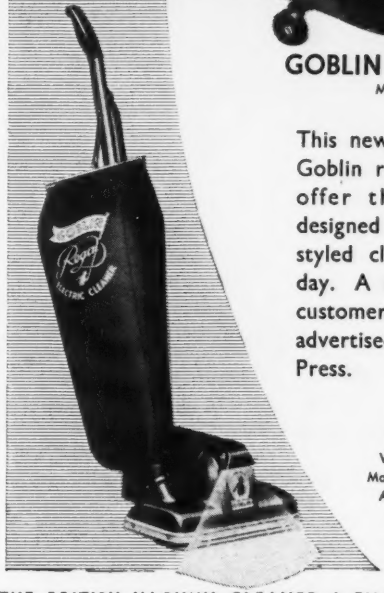

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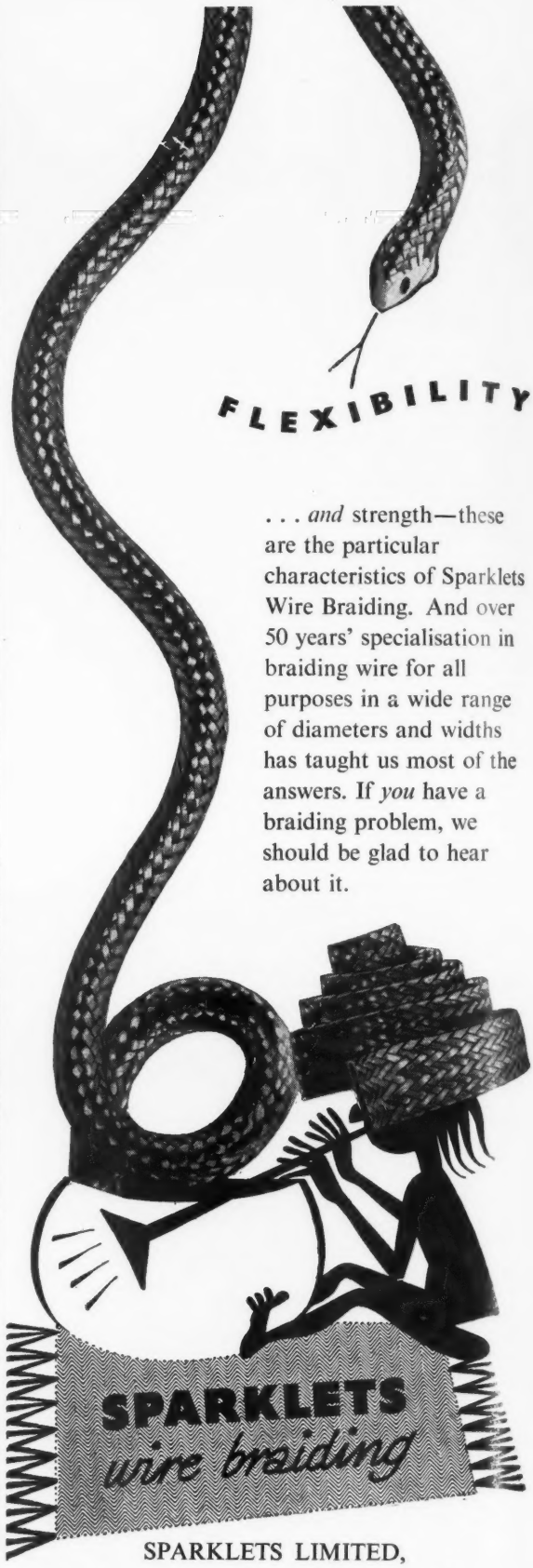

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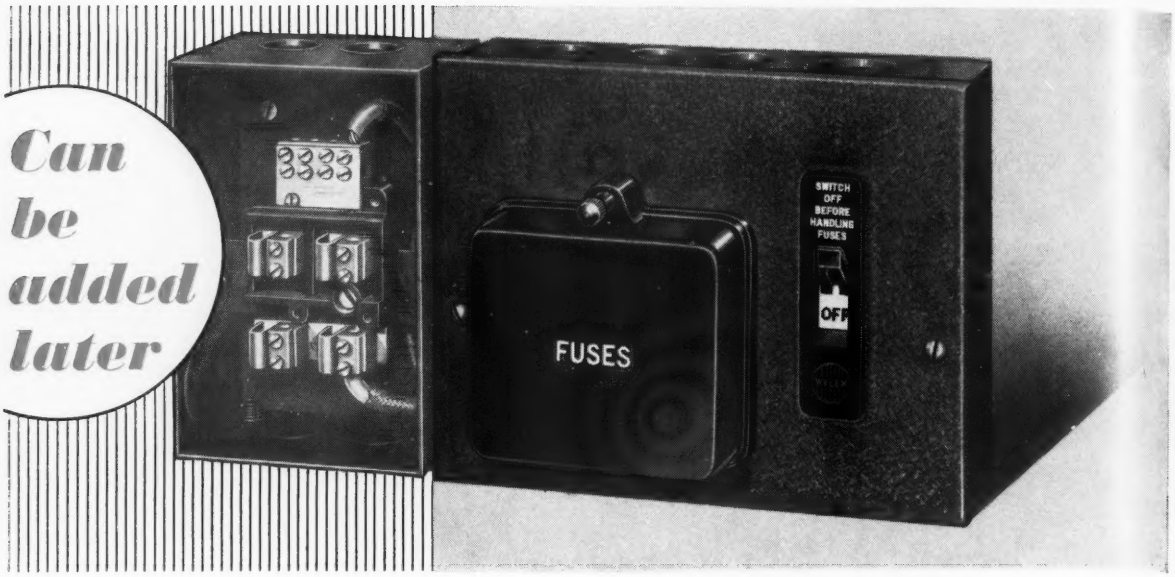

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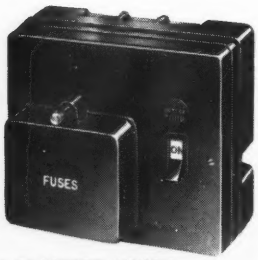

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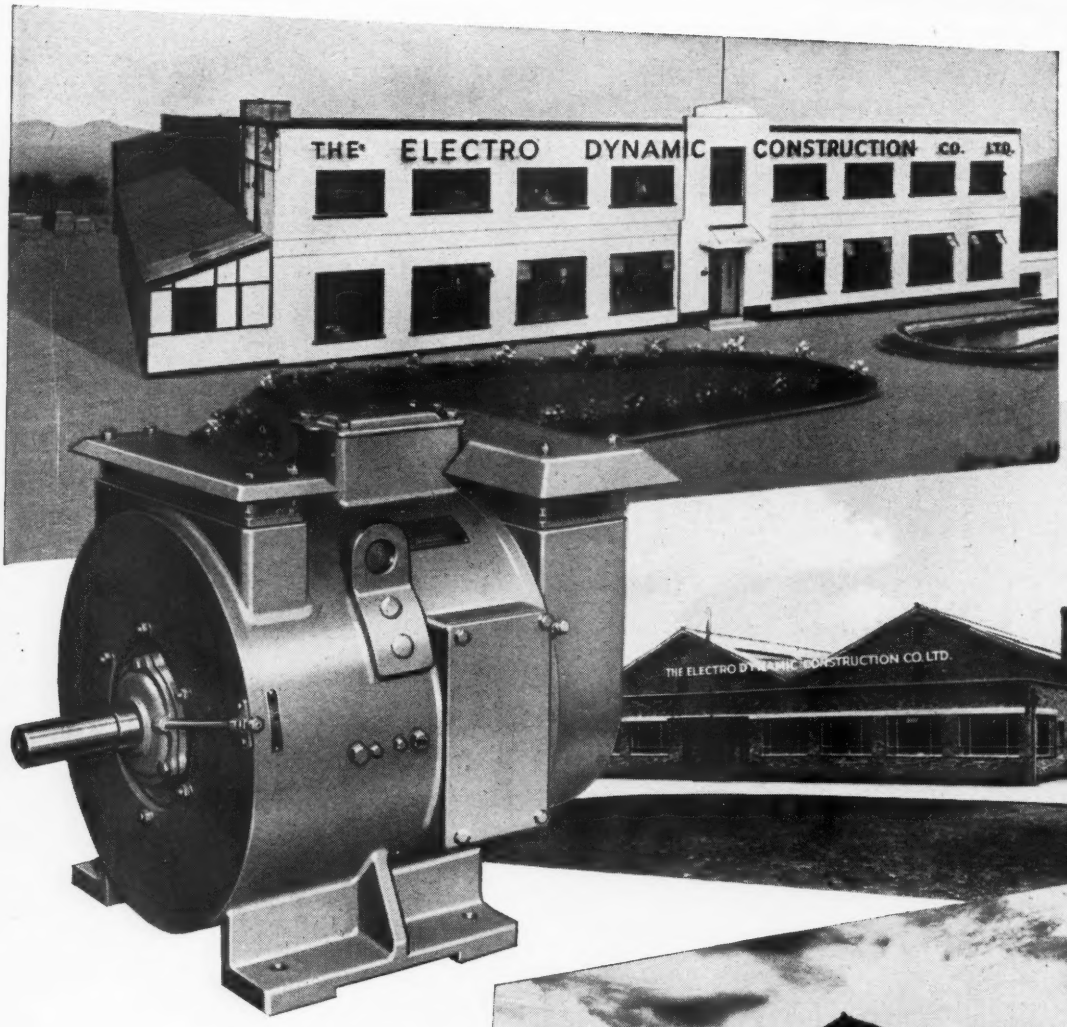

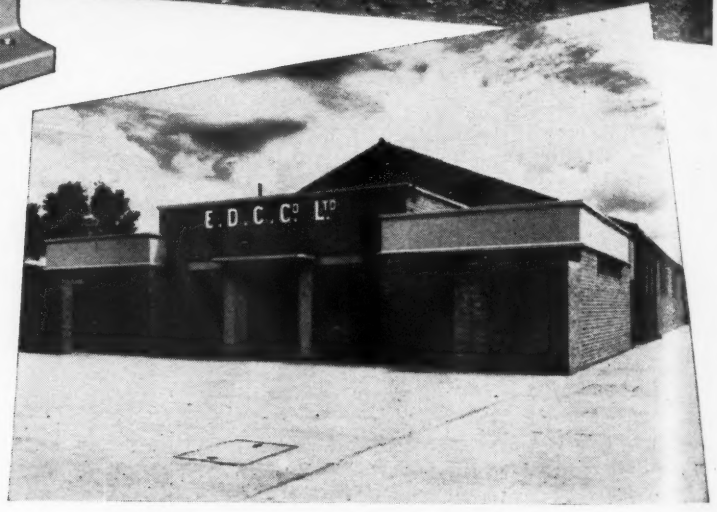

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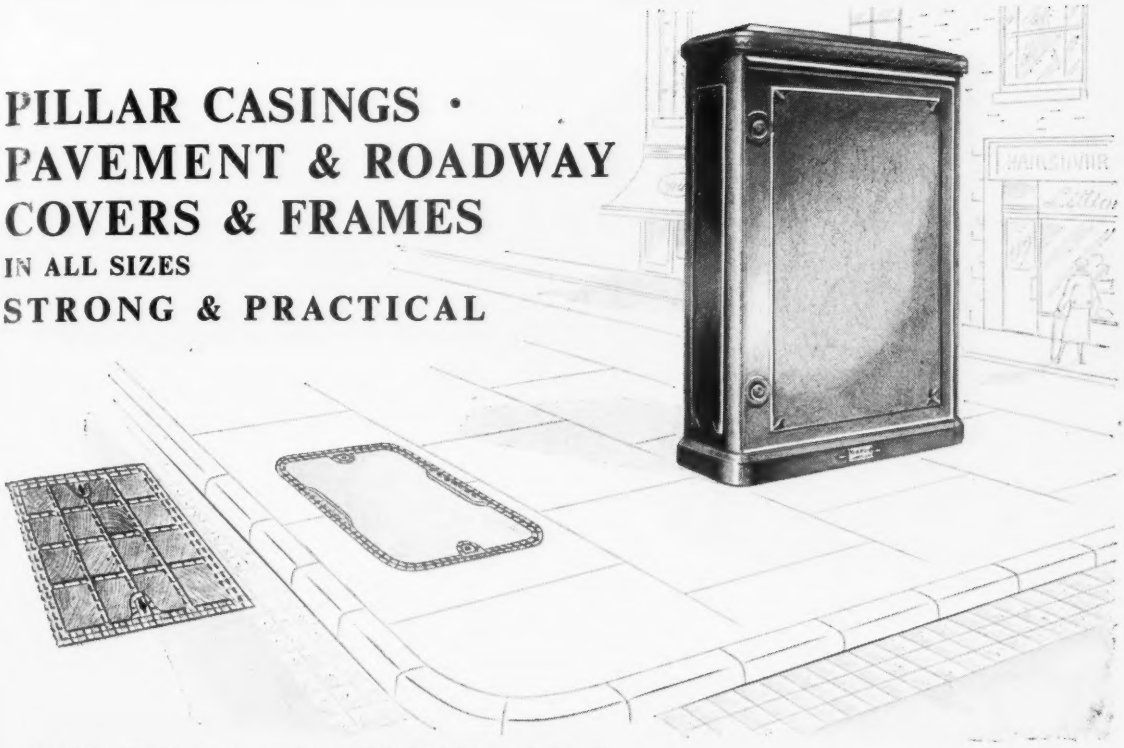

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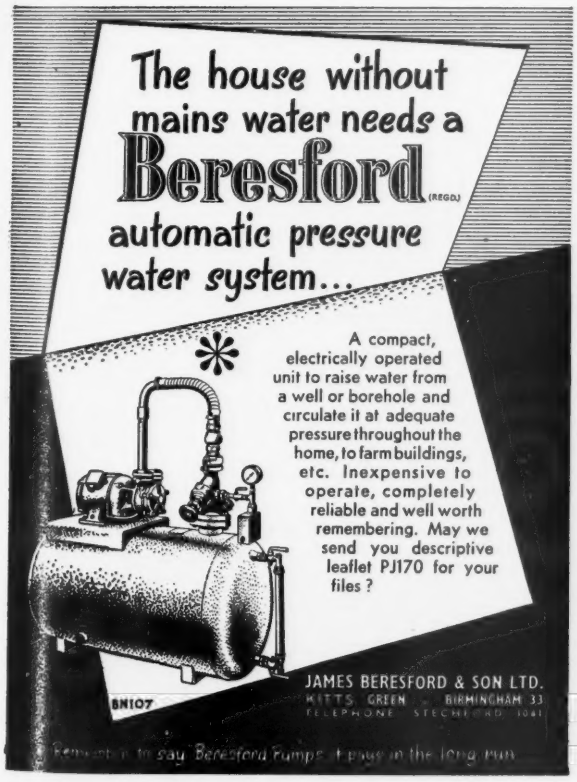

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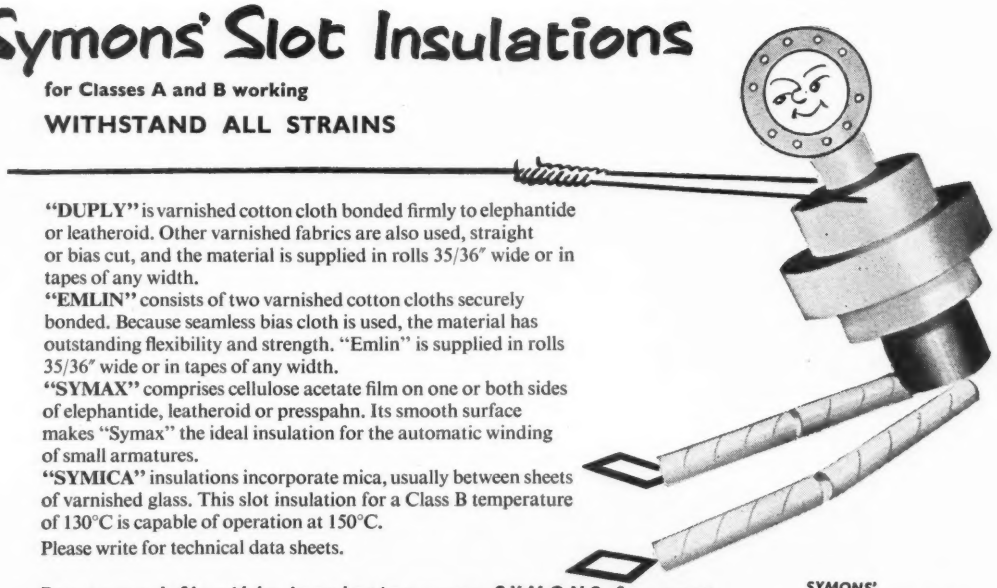

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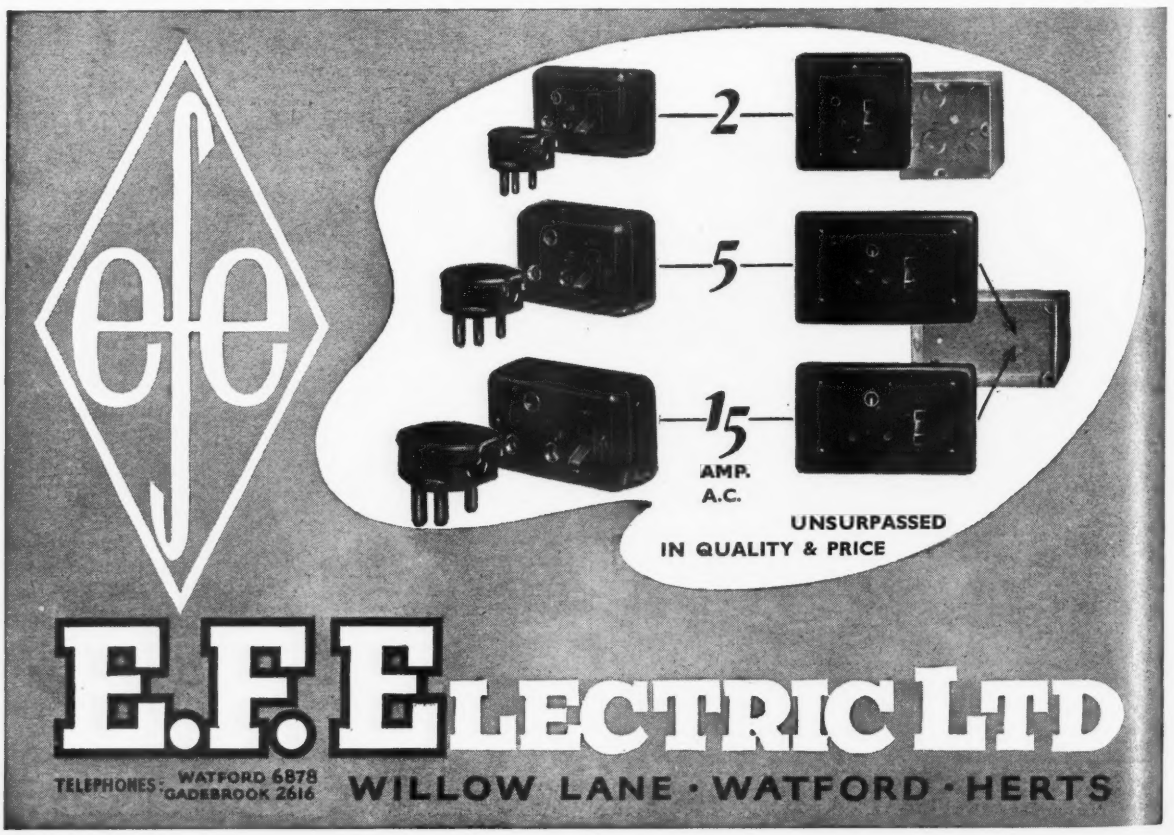

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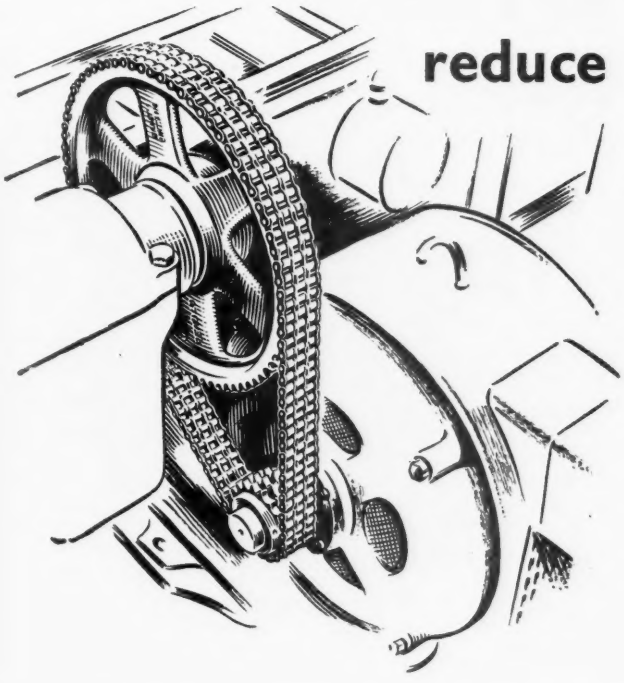

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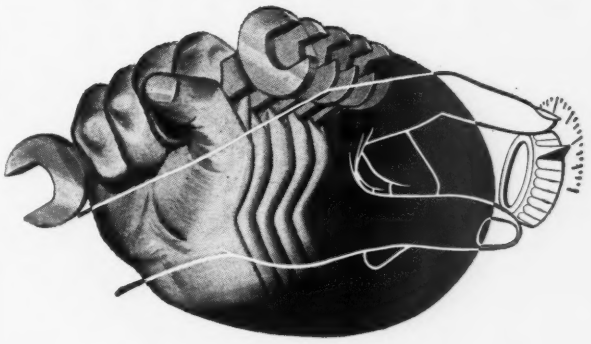

step by step

If you use processes depending on accurate repeat timing, then a Process Timer, a Delay Switch or a Cyclic Timer may help you to change over to automatic control.

Elcontrol Timers are suitable for repetition switching at intervals up to 5 minutes.

They can often be introduced into existing control systems, and sequence control panels to suit individual needs can be designed around them.

Let us have details of your process—we shall be glad to advise.

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EARLS COURT LONDON
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ELCONTROL LTD

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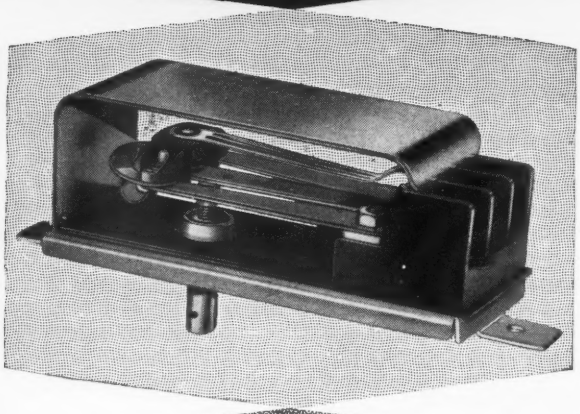
TIMERS LEVEL CONTROLS FURNACE SAFEGUARDS PHOTO SWITCHES

A NEW, LOW PRICED THERMOSTAT FOR ELECTRIC CONVECTOR HEATERS



THIS compact thermostat, which is quite simply mounted inside the space heater, quickly solves heat control problems for the manufacturer — at low cost. Designed to operate a non-magnetic snap action switch when the desired temperature is reached, it responds immediately to small changes in temperature and is suitable for all appliances passing up to 15 amps. at 110/250 volts A.C. When fitted to heater, finger-tip adjustments to range can be made. It allows manufacturers to use their own scale plate and knob to harmonise with the design of the appliance.

- ✻ Fine temperature control
- ✻ Switch can be set to operate at any point between 35 and 85° F.
- ✻ Weighs only 3.7 ozs. (105 grams).
- ✻ Switch unit and terminals mounted on bakelite moulding.
- ✻ Designed to meet requirements of electrical authorities, at home and overseas.

For detailed description and specification send for leaflet AT.35. Trade terms on application.

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THERMOSTAT TYPE PJ.A.1

THE BRITISH THERMOSTAT CO., LIMITED
SUNBURY-ON-THAMES · MIDDLESEX
Tel: Sunbury-on-Thames 456
Branch Offices at Birmingham, Manchester, Nottingham and Glasgow

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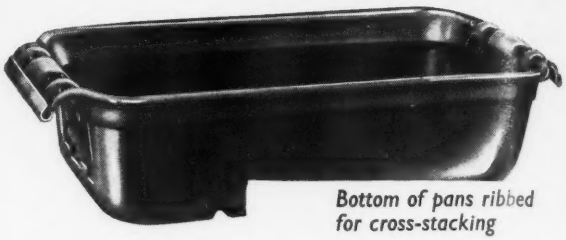

Bottom of pans ribbed for cross-stacking

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- Strong, one-piece pressing with no sharp corners.
- Easy lift handles.
- Built-in index card holder.
- Ribbed bottom for safe cross-stacking.
- Positive loading line, cannot be loaded beyond manual capacity to lift.

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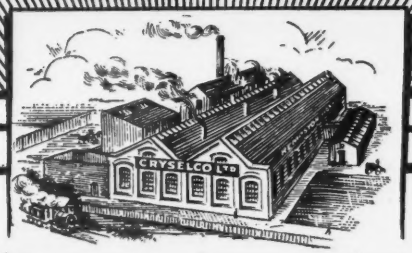
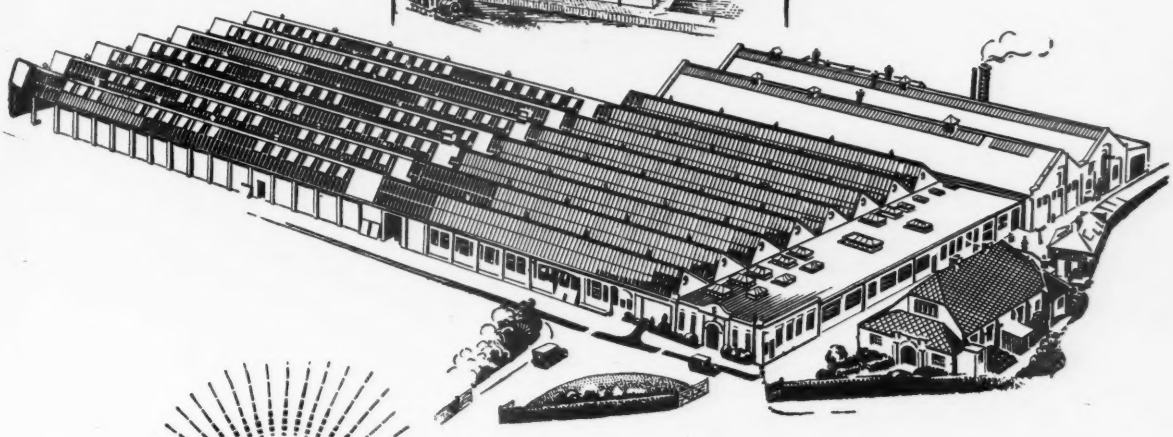
1895  1955



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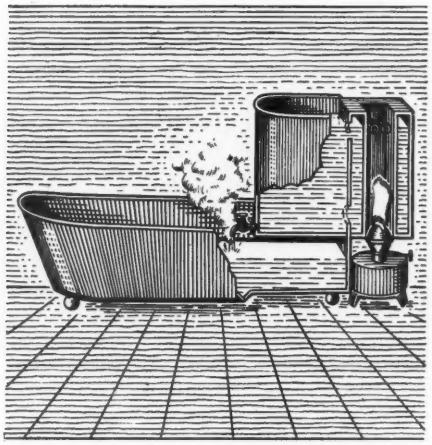

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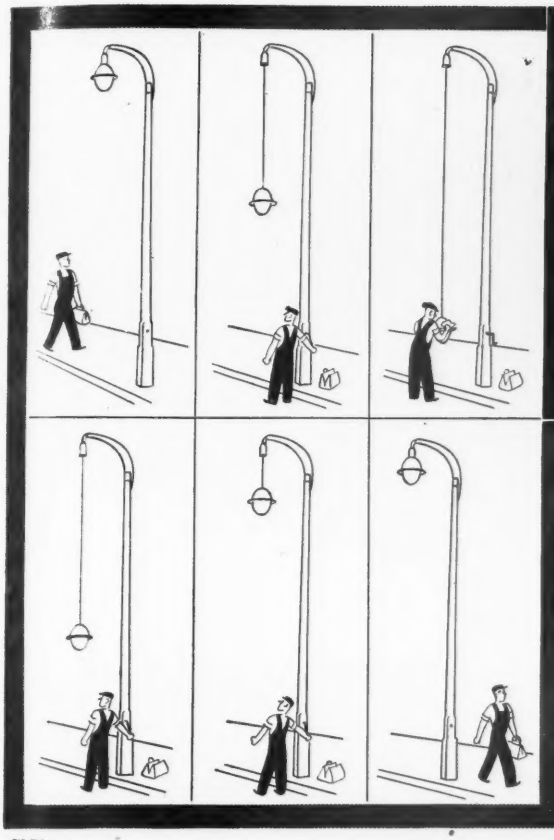

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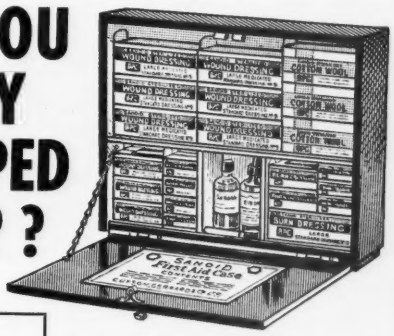

The First Aid Outfit illustrated is in accordance with S.R. & O. 1938, No. 486 (Standard Outfit B) for concerns in which mechanical power is used, and in which the number of persons employed exceeds ten but does not exceed fifty.

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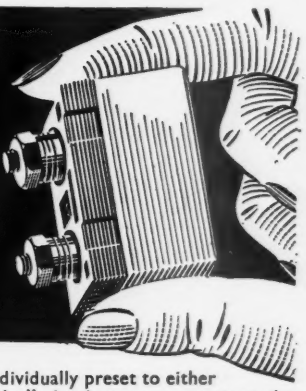

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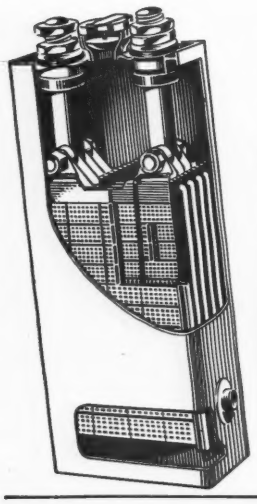

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13 amp. SOCKETS

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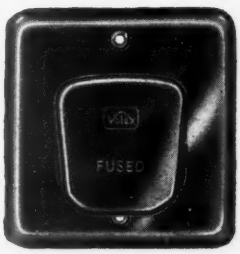

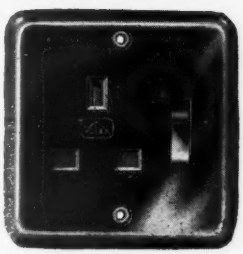

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This 13 amp. range has been designed and produced only after extensive research into the requirements of the Electrical Contractor.
The conveniently placed terminals which are mounted on a ceramic base amply accommodate 7/.029″ looped cable and an additional 7/.029″ spur.
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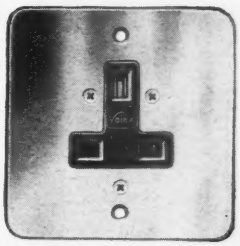

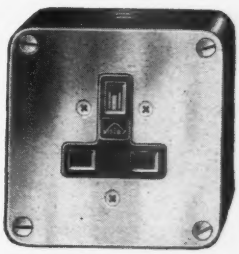

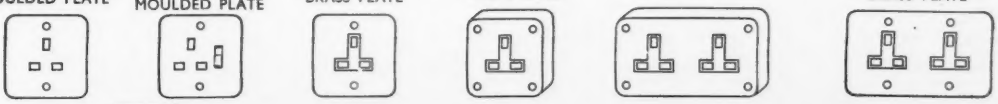
FLUSH TYPE. MOULDED PLATE
FLUSH TYPE WITH SWITCH. MOULDED PLATE
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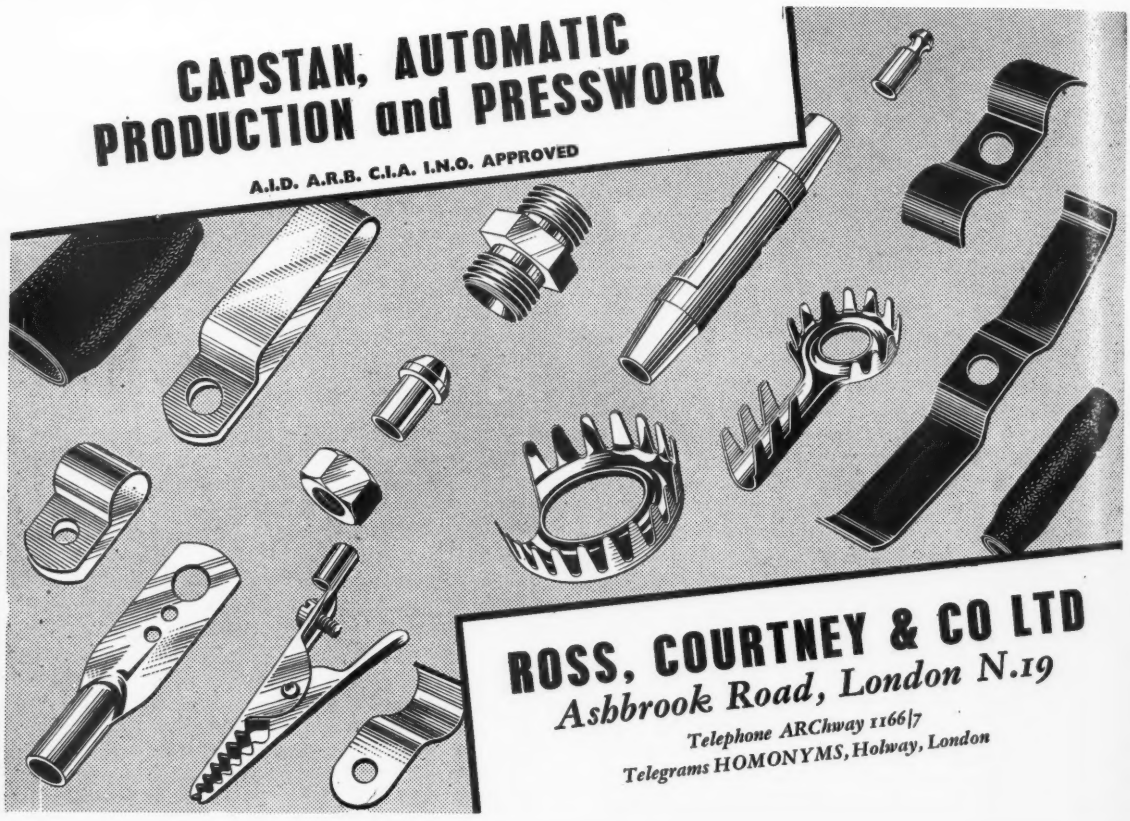

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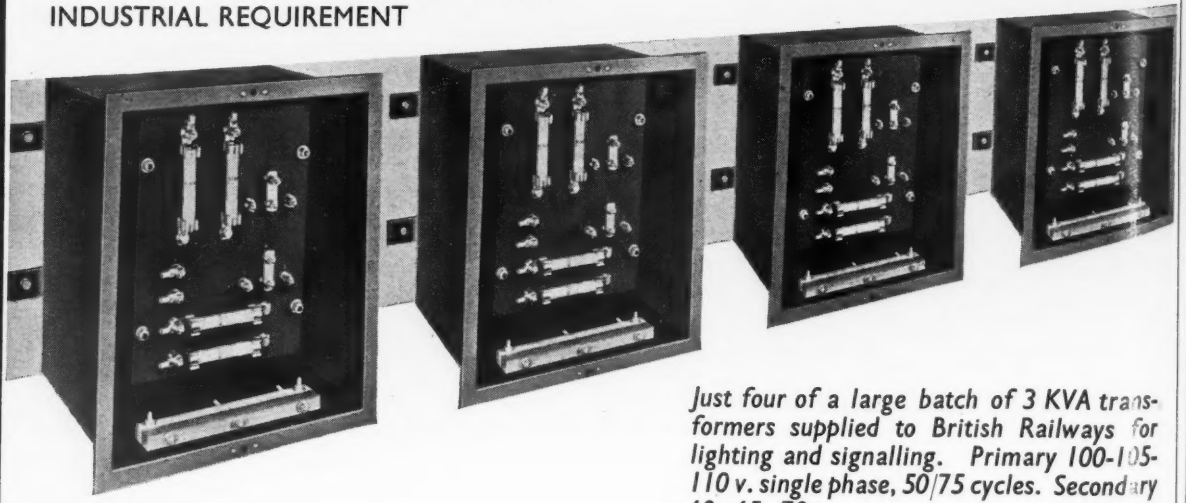

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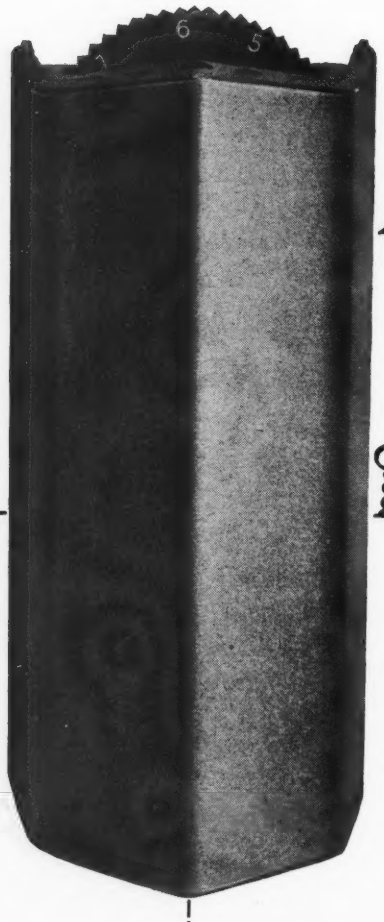

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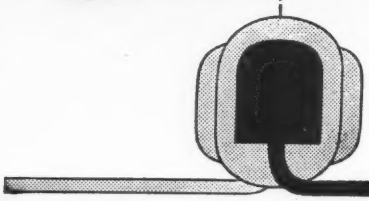

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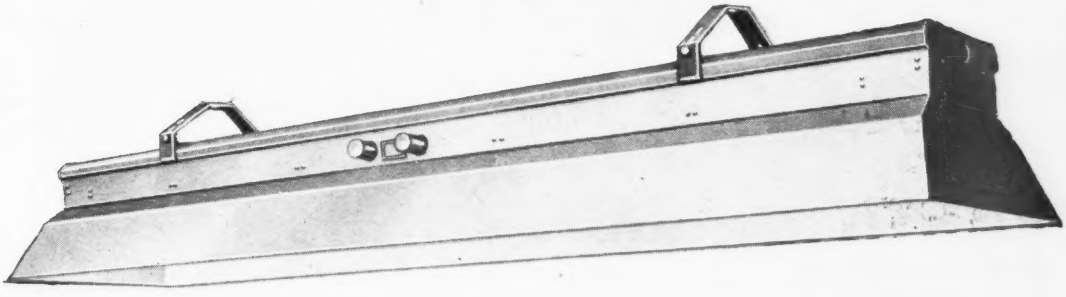

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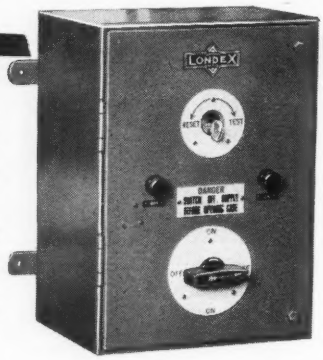

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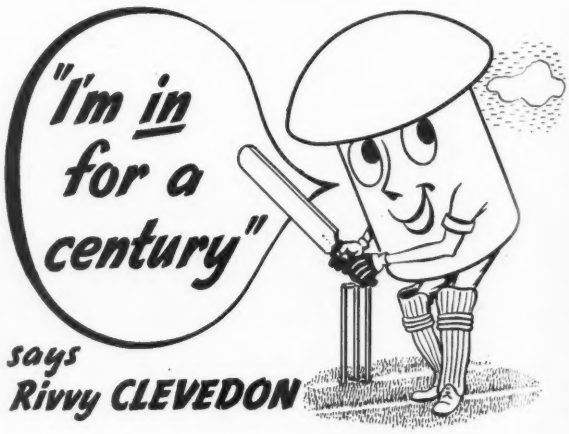

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My record shows that I've never been caught out nor stumped in any Test."

rivets in aluminium, brass, copper, nickel and all light alloys . . .

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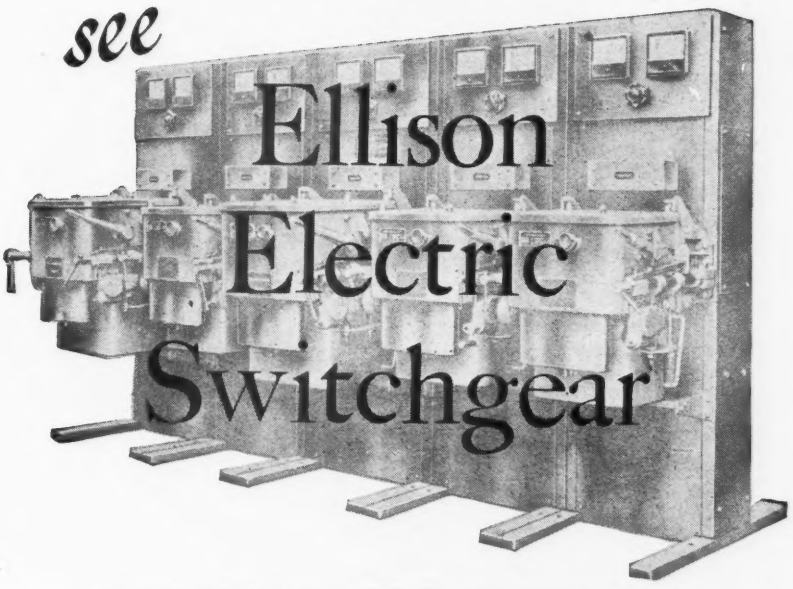

Ellison Electric Switchgear

STAND 92

SPORTS STADIUM, BRIGHTON

JUNE 27th—JULY 1st

TRADE (E) MARK
GEORGE ELLISON
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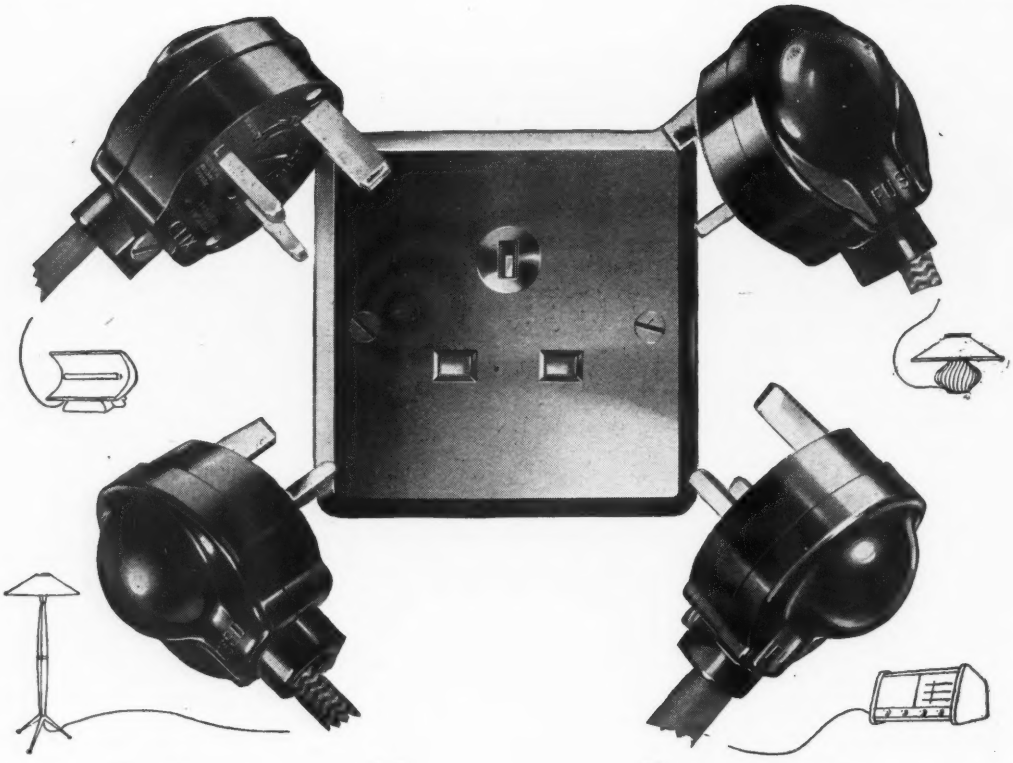

4 into 1 *won't* go...

...so be generous when specifying the number of Socket Outlets for each room.

THE Windsor range of Ediswan Wiring Accessories includes all types of 13 amp. Socket Outlets, Switch Socket Outlets and rectangular pin fused Plugs required for normal installations—quality Accessories at competitive prices. Remember also that Ediswan manufacture a Plug which can be re-fused in 15 seconds.

STAND No. 26
B.E.P.C. EXHIBITION

EDISWAN

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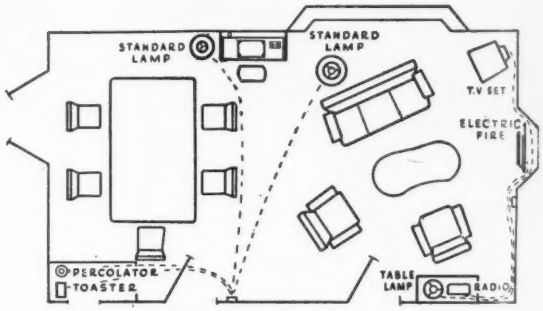
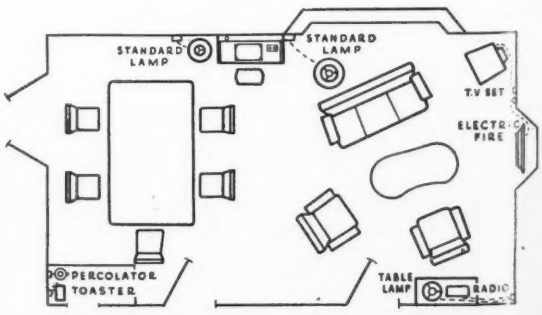
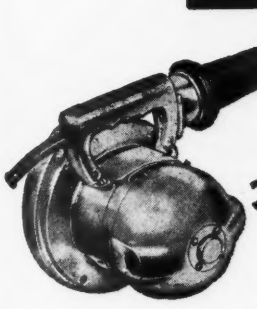


Insufficient socket outlets wrongly placed. Note the long trailing flexibles running dangerously across doorways and "traffic ways".



Correct arrangement of socket outlets. Long flexibles and inconvenient adaptors are avoided.

MARTINDALE



A portable air blast

or

hot air on tap

The long thin insulated nozzle makes it possible to blow out dust from the most awkward corners of electrical switchgear, motors, electronic equipment and other plant, even when "alive." A selection of five machines of various sizes is available to cover all kinds of work where either a blower or a portable vacuum cleaner is required.

Martindale Hot Air Blowers, in powers from 500 — 3,000 watts, are ideal for the quick drying of windings of all kinds before and after varnishing, and for many other purposes connected with the electrical industry. Can be used with the heat off as blowers for dust removal and vacuum cleaning.

Martindale Portable Blowers are of first-class construction and guaranteed for a year against faulty workmanship. Supplies from stock.

See our exhibits at the BRITSH ELECTRICAL POWER CONVENTION
STAND No. 89 Brighton 27 June-1 July

MARTINDALE ELECTRIC CO. LTD.
4 WESTMORLAND ROAD, LONDON, N.W.9
also at Elmbank Street, Glasgow, C.2

Variable Speed Drives

FOR ALL FORMS OF CONTINUOUS PROCESS PLANT

⅝ H.P. up to 22 H.P. Drives.

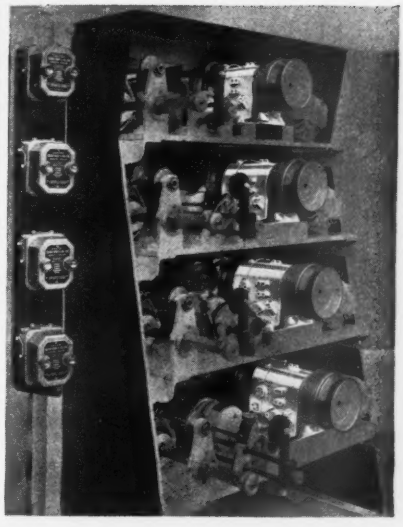
Infinitely Variable Output Speed.

Speed controls adjustable with drive running or stationary.

Hand, Electric remote, or Automatic Speed Controls.

Send for full particulars.

Right: Fine wire-tinning plant built by Mr. S. C. MEREDITH. Illustration shows four variable speed capstans.



CARTER GEARS LIMITED
Thornbury Road, Thornbury.
BRADFORD YORKSHIRE
Phone. 64378/9
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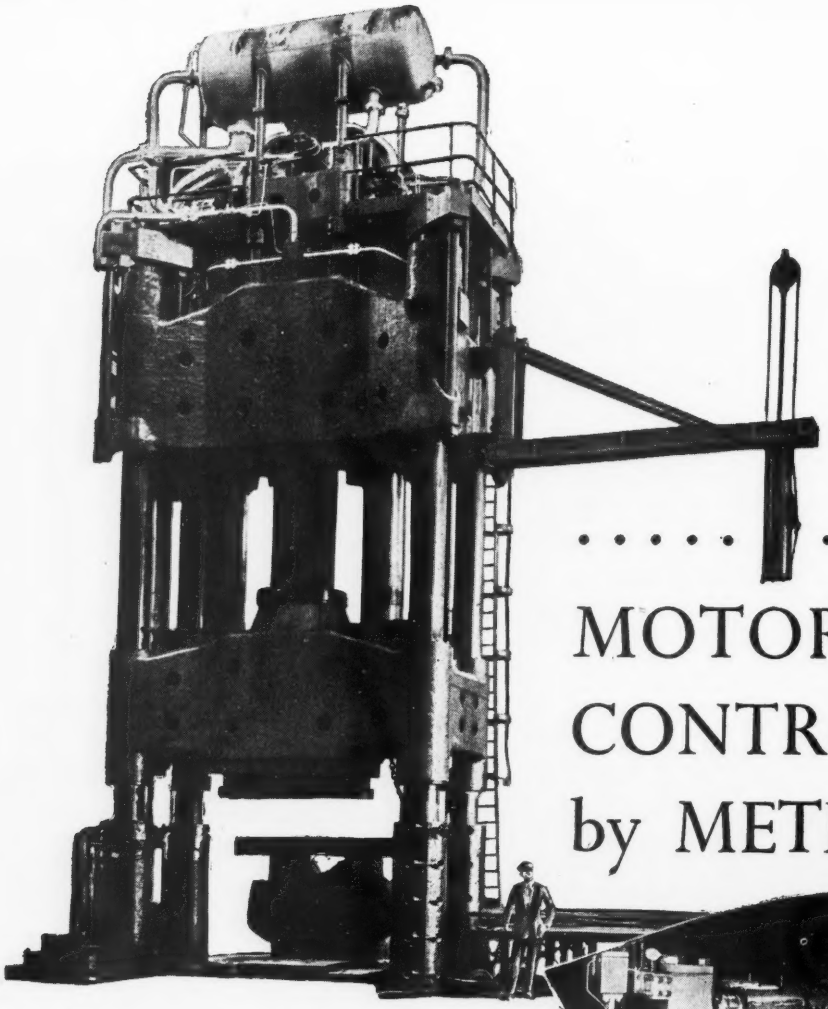
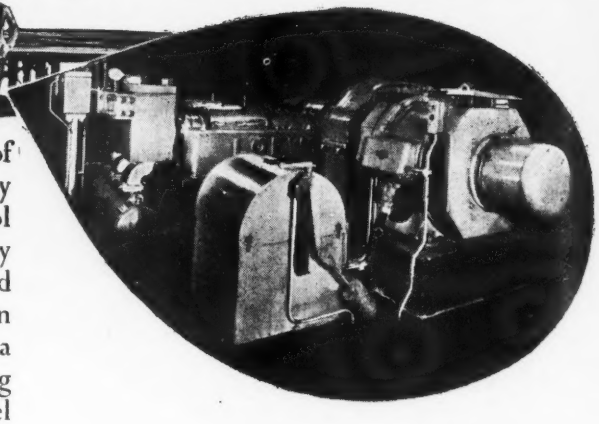


.....with MOTORS and CONTROL GEAR by METROVICK



For maximum reliability and ease of maintenance, leading plant and machinery manufacturers choose motors and control gear by Metrovick. This 2,700 ton Loewy hydraulic press, for example, is powered from an air hydraulic accumulator station with five pumps each driven by a Metrovick 550 hp type RW slipring motor. The type R series of squirrel cage and slipring motors extends from 35 to 3,000 hp. Various types of enclosures are available including screen protected, drip-proof, totally enclosed with pipe ventilation, or totally enclosed with fan cooling. Write for descriptive literature dealing with your particular interest.

One of five 550 hp 730 rpm screen protected 3·3kV type RW slipring motors with type LF liquid rotor starter driving a Loewy high pressure hydraulic pump for use with hydraulic presses at Hadfields East Hecla Works, Sheffield.

METROPOLITAN-VICKERS
ELECTRICAL CO LTD · TRAFFORD PARK · MANCHESTER 17

J/A 301

And he's glad of it too! For in times of emergency he can always rely on the P & G batteries installed in his power station for switch tripping and closing, auxiliary services, and emergency lighting. Throughout the country P & G batteries are used to cover the vast and varied field of electricity supply: including batteries for generating stations and substations, railway electrification work, emergency lighting, telephone electricity supply. If you have a project, discuss it with our specialists. Our 3-point service covers (1) Technical Advice and Specification (2) Equipment and Installation (3) Regular Inspection and Report.

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for SWITCH CLOSING
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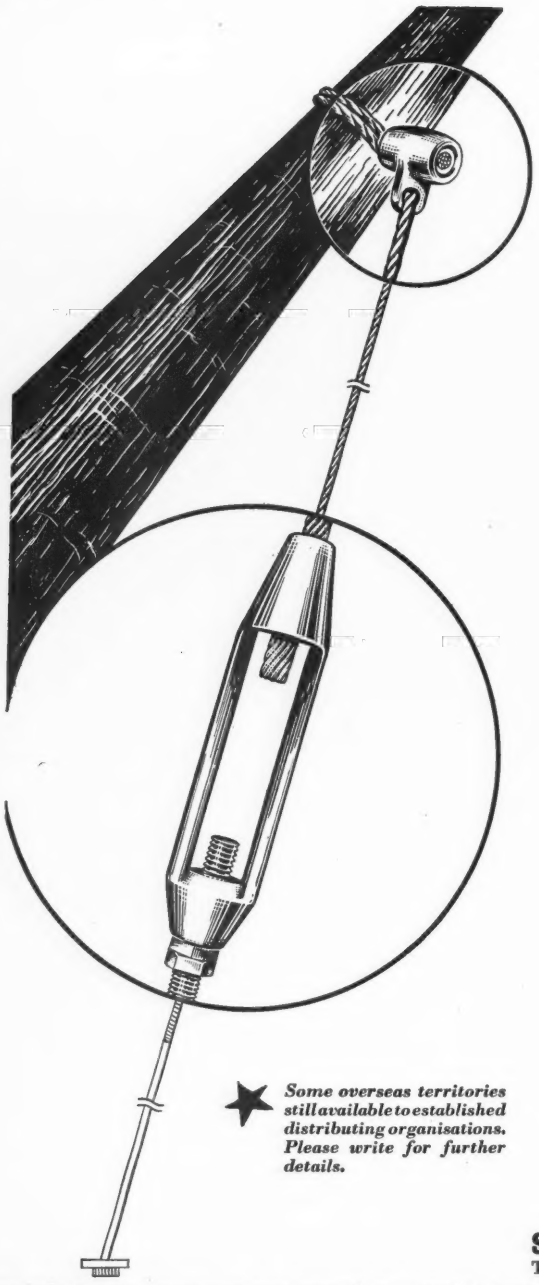

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For Speed and Economy in Overhead Line Transmission Equipment

ESSENTIAL EQUIPMENT THAT CUTS BOTH STAY AND OVERHEAD LINE ERECTION COSTS

The CCL principles of wire connections have established themselves firmly in most Electricity Boards. They include the fully adjustable Automatic Stay which eliminates all make-offs . . . Terminating Clamps . . . Connectors . . . and Line Taps. Gladly will we send fullest information on request.

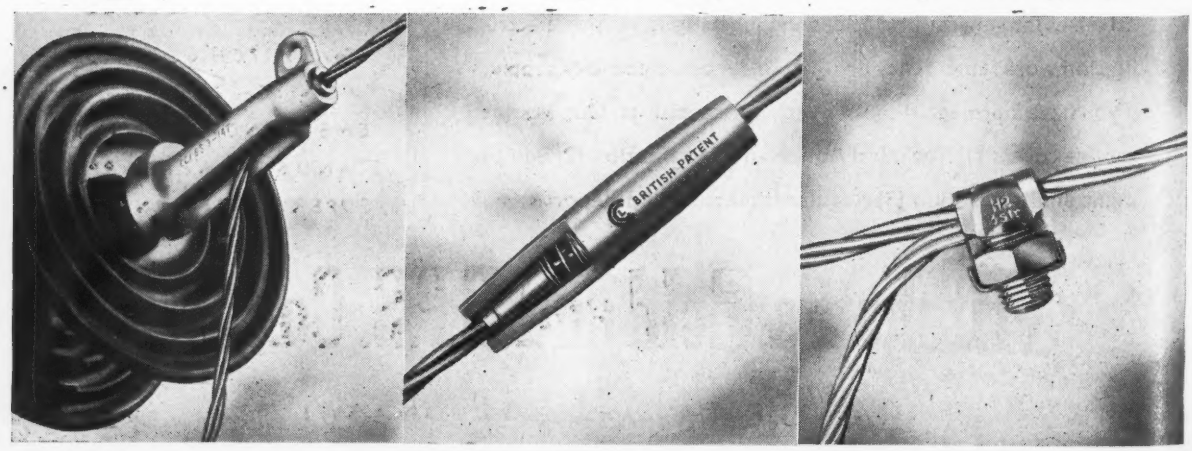
Some overseas territories still available to established distributing organisations. Please write for further details.

The Symbol CL of Efficiency

CABLE COVERS LIMITED

ST. STEPHEN'S HOUSE · WESTMINSTER · S.W.1.

Telephone: ELMbridge 7241 Telegrams: Bricavity, Parl, London.



ADAPTABILITY to site conditions

Whilst standardisation of components is a desirable objective, it is inevitable that, in all large scale projects, special problems will arise calling for individual study and solution by experts at the job. We at "Ferguson Pailin" claim to possess the necessary qualifications of knowledge, skill and experience to advise on the initial planning and subsequent construction of switchgear installations of any capacity or, alternatively, extensions to existing systems to provide increased output in the most efficient and economical manner. Please get in touch with us

AT THE START

Photographs of Northampton Power Station by courtesy of the Central Electricity Authority

The photographs show:—
1. *Type VTR 13/3 switchgear.*
2. *Busbar crossover trunking chambers positioning units to suit direction of approach of main cables.*
3. *Control Room.*

—a matter of the **FIRST** *importance to* **'FP'** *designers*

Ferguson Pailin LIMITED *for Switchgear*

Member of the A.E.I. Group of Companies

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The New
MACLAREN
Water Heater
THERMOSTAT

with **KNOB ADJUSTMENT**
(OVER RANGE OF 40°F.)
OR FIXED SETTING IF REQUIRED

Points about the new model, Type M.B.:–

A simplified version of our Type A.C.M., designed to satisfy the demand for a smaller instrument at lower cost.

Takes 15 amps. Temperature control by knob over 40°F.

SEE THIS AND A RANGE OF OTHER MACLAREN INSTRUMENTS ON OUR STAND No. 43 AT THE BRITISH ELECTRICAL POWER CONVENTION AT BRIGHTON.

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EGLINTON WORKS
KILBIRNIE STREET, GLASGOW, C.5
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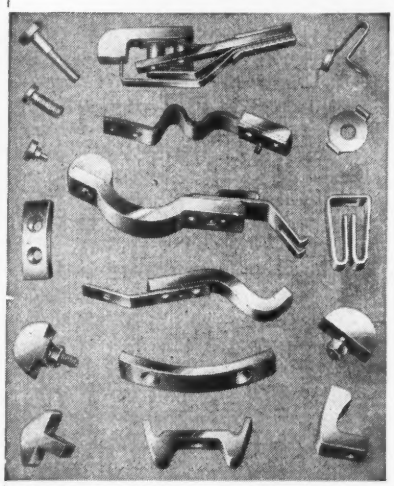
ALWAYS AT YOUR SERVICE WITH

1000 REPLACEMENT ELEMENTS

We shall be glad to send you copies of our
ILLUSTRATED CATALOGUES
MYK/2/ER Elements & Spirals. DAR/2/ER Immersion Kettle Elements. JYL/30/ER Industrial Elements.
Please indicate which lists required.

METWAY ELECTRICAL INDUSTRIES LTD.
METWAY WORKS CANNING STREET, BRIGHTON 7
Phone: Brighton 28366 *Grams: Metway Phone Brighton*

CONTACTS



SMALL METAL PARTS

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MACHINING AND PRESSWORK

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Contacts for every Electrical Purpose in any metal. Switch and Control Gear Spares for every type of British or Foreign Gear. Any Quantity, Any Metal. Small parts machined and pressed to your requirements against drawings or samples. Machined Parts in insulation materials a speciality.

PAXTONS (ELECTRICAL) LTD.
WESTON-SUPER-MARE, ENGLAND
A.I.D. APPROVED *Phone 1357*

A personal invitation to you

When you visit the B.E.P.C. at the Sports Stadium, Brighton, (27th June–1st July), you'll find it well worth while to look in at the Siemens Brothers Group of Companies Stands 8 and 9. Here we are exhibiting a wide range of our products. There will be skilled technical sales staff available to answer any questions and give advice on particular problems. Afterwards we are at home to you at Robertson Hall, Ship Street.*

We are running a special car service between the Exhibition and Robertson Hall.

THE SIEMENS BROTHERS GROUP

THE SIEMENS BROTHERS GROUP OF COMPANIES

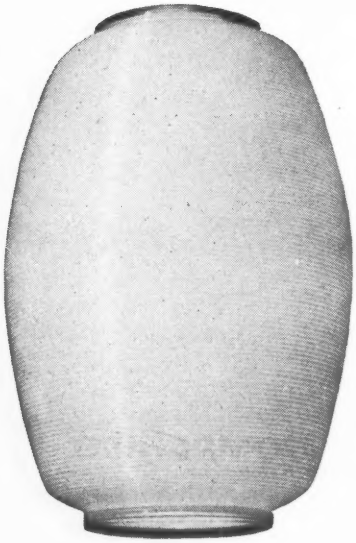
SIEMENS BROTHERS & CO. LIMITED
SIEMENS ELECTRIC LAMPS & SUPPLIES LIMITED
ALFRED GRAHAM & CO. LIMITED

Exciting new look

Here's a grand impetus to sales—an entirely new Atlas range introducing a new material for reflectors—'Rotaflex' spun acetate. Lively, contemporary designs full of sparkle: crystal and pearl mixes: good diffusion: freedom from dust-collecting properties: non-inflammable—these are some of the many pleasing qualities of this enterprising Atlas range.

Not least among other features is versatility. Several shades can be inverted, or used with others to form even more interesting combinations; and a comprehensive range of galleries is available to accommodate lamps from 60 to 200 w. ratings.

for lighting schemes



TOP RIGHT: Atlas lighting fitting in 'Rotaflex' design No. RXS 0200. Lower half is in pearl with upper half in crystal mix to provide generous upward lighting. This shape is available in two sizes to suit lamps from 60-200 w.

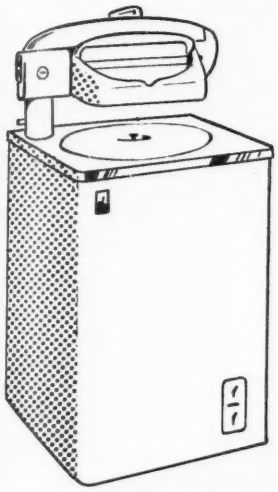
ABOVE LEFT: Atlas design No. RXA 0200 again has a lower half of pearl 'Rotaflex' and upper half in crystal mix. This design, however, can be used equally well in an inverted position, effective light distribution being provided in both upward and downward directions.

LEFT: Another attractive design—No. RXB 0200, in pearl 'Rotaflex' only, available in two sizes. All these fittings can be used with batten or cord lampholders. Galleries are carefully matched to sizes of fittings and lamps.

...introduced by ATLAS

THORN ELECTRICAL INDUSTRIES LTD ATLAS LIGHTING DIVISION 233 SHAFTESBURY AVENUE LONDON WC2

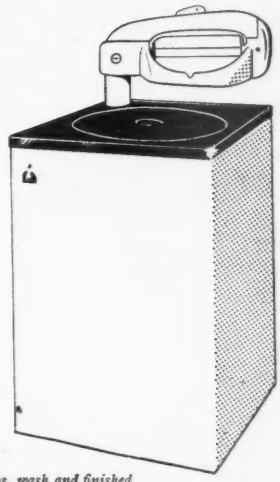
THE FISHER P T P PLAN



P Price!—The lowest, the finest quality, the best yet! Backed by the new live sales and service plan together with extensive advertising promotion.

T Terms!—The best ever, supported by the NEW FISHER H.P. SCHEME.

P Performance! Peak! Yet offers the choice of two hard wearing, family size models in various colour schemes, which, with national advertising and demonstrations, are going to make housewives *insist* on Fisher.
Compare Price, Terms and Performance! Then 'phone FISHER for details of nearest Distribution Depot and new Sales Aids available.



Model ER:—sturdily built for approx. 8 lbs. wash. Acme power wringer, fast heating unit and pump. Luxurious finish. Table top optional extra.

MODEL ER
Capacity 8 lbs.

Model L:—for approx. 7 lbs. wash and finished in high grade cream or white enamel. Acme power wringer. Pump and Table Top optional extras.

MODEL L
Capacity 6½ lbs.

FISHER

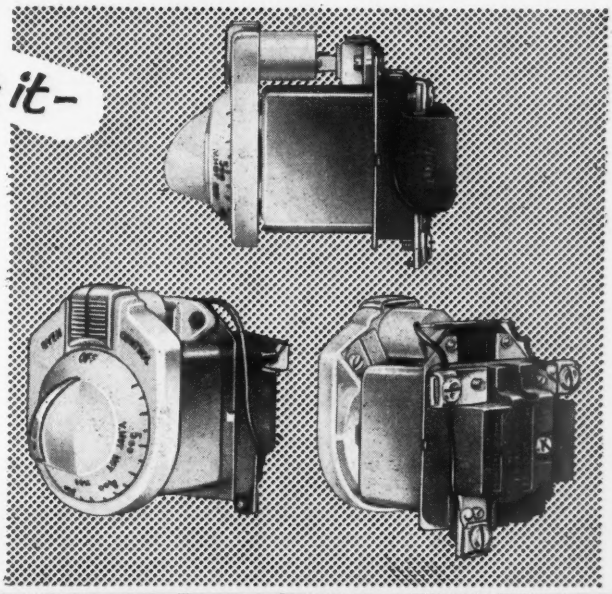
H. FISHER (OLDHAM) LTD., Pennant St., Oldham, Lancs.
Tel: Oldham Main 4628.
London Showrooms: Lloyd House, 44 Bryanston St., London, W.1. Tel: Paddington 4078.

See the 'DIAMOND H' range of streamlined THERMOSTATS at the B.E.P.C.

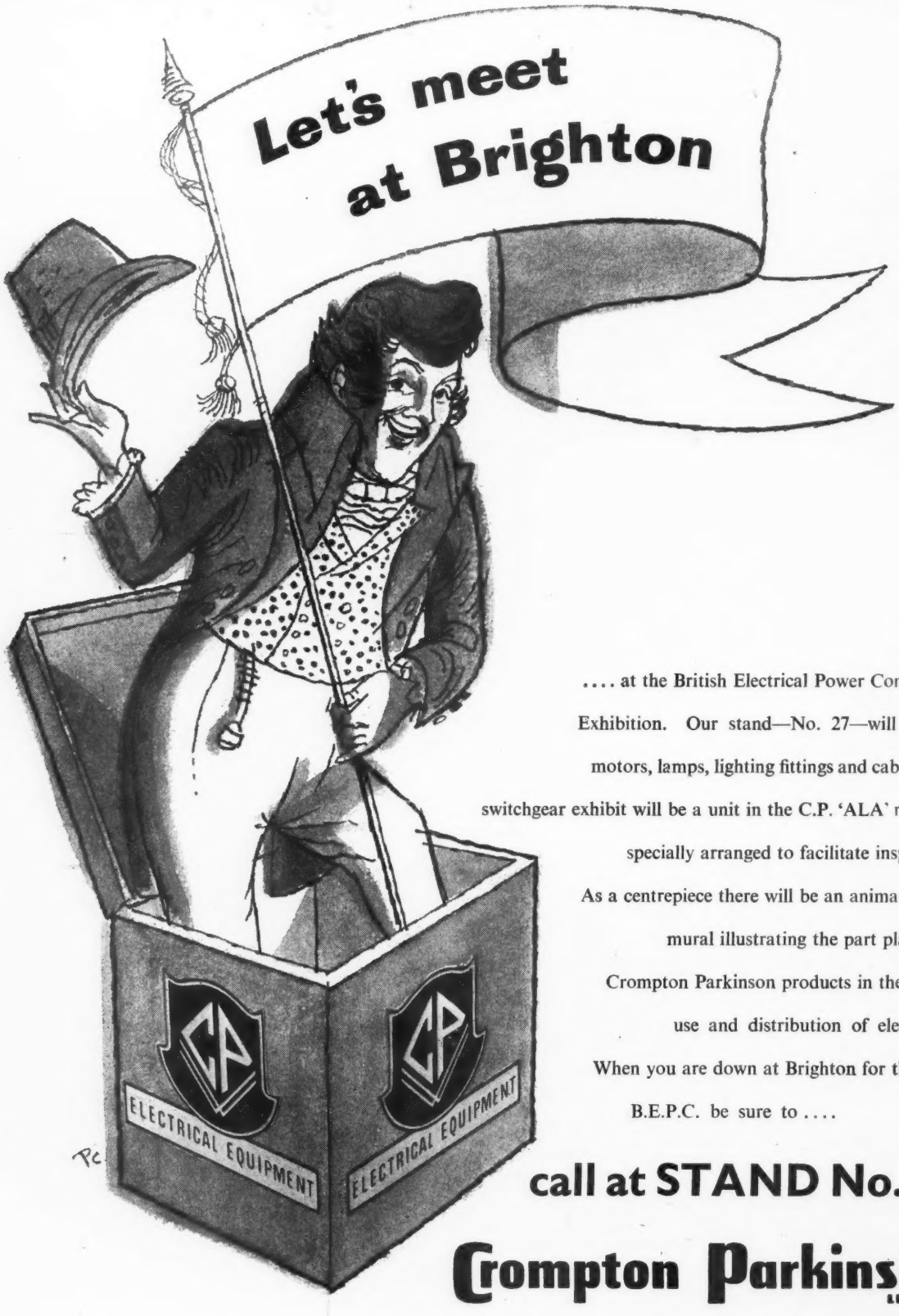
Whichever way you look at it—

NO OTHER OVEN THERMOSTAT HAS ALL THESE FEATURES—

- Front of panel calibration.
- Positive mechanical indexing in the "OFF" position.
- Hydraulic type—thus the sensitive phial can be placed in the most efficient position in the oven and the instrument head in the most convenient place.
- Easily replaceable plug-in-neon pilot light. Average life 7 years.
- New high lever ratio switch movement.
- Also fitted with Grill switch for 3 stage Preheat control series 9TH–13TH.
- Streamlined push-on handle dials with metal inlays available in wide range of colours.



'DIAMOND H' SWITCHES LTD. GUNNERSBURY AVENUE, CHISWICK, LONDON, W.4.
TELEPHONE CHISWICK 6444 (5 LINES) • TELEGRAMS DIAMONHART, CHISK, LONDON.



.... at the British Electrical Power Convention Exhibition. Our stand—No. 27—will display motors, lamps, lighting fittings and cables. The switchgear exhibit will be a unit in the C.P. 'ALA' range, specially arranged to facilitate inspection. As a centrepiece there will be an animated mural illustrating the part played by Crompton Parkinson products in the use and distribution of electricity. When you are down at Brighton for the B.E.P.C. be sure to ....

call at STAND No. 27

Crompton Parkinson LIMITED

A good name for electrical equipment

CROMPTON PARKINSON LTD. CROMPTON HOUSE, ALDWYCH, LONDON, W.C.2. 'Phone: Chancery 3333. 'Grams: Crompark, Estrand, London

If it's

CABLES

it's Rists

FOR EVERY PURPOSE:

You can be sure of complete satisfaction from Rists T.R.S. and V.I.R. house wiring cables. Manufacturers of Cables for internal maintenance wiring, electric fans, soldering irons, welding and trailing purposes, switchboard panel wiring, stove wiring and generally for all industrial uses.

Please write for further details to Electrical Division

RISTS

RISTS WIRES & CABLES LTD.

BRITAIN'S LARGEST MAKERS OF THERMOPLASTIC CABLES

LOWER MILEHOUSE LANE • NEWCASTLE-UNDER-LYME • STAFFS

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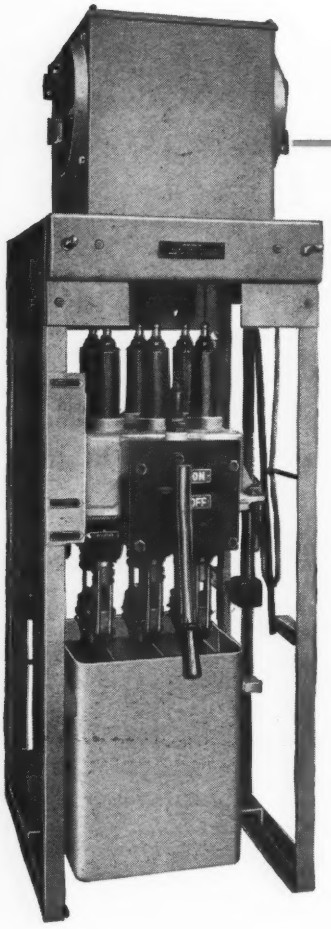
B·E·P·C EXHIBITION



ONE of the

EXHIBITS ON STAND 47

The Trinal Oil Switch, illustrated on the left, is but one of the interesting switchgear units to be seen on the J. & P. stand.

In addition, we are introducing a new design of oil switch for ring main units which has recently been short-circuit tested to 250 MVA at 11 kV, and also a metalclad vertical isolation circuit-breaker rated at 500 MVA and 350 MVA at 11 kV and 350 MVA at 6.6 kV.

THE TRINAL OIL SWITCH

Type TOS

★ Complete isolation with no interruption of supply in ring main units.

★ Suitable for systems up to 250 MVA at 6.6 kV.

★ Electro-magnetic forces assist closure of the switch.

★ Liberal clearances with small dimensions.

A FULL RANGE OF BNE DOMESTIC APPLIANCES CAN BE SEEN ON STAND No. 46

JOHNSON & PHILLIPS LTD.

CHARLTON • LONDON • S.E.7

ELECTRICAL ENGINEERS AND CABLE MAKERS. EST. 1875

FERRANTI *Sealed Instruments*

The Ferranti 3½" hermetically sealed instrument in steel case with fixing flange has received Design Approval from the Joint Service Radio Components Standardisation Committee. This instrument is designed to comply with RCS.231 and RCL (PROV) 231

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The MORPHY-RICHARDS Heat Controlled STEAM AND DRY IRON offers every woman Steam Ironing Luxury

FOR ONLY 59/6 INCLUDING ACCESSORIES

And that is what national advertising this summer will be telling your customers

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Only the MORPHY-RICHARDS Heat Controlled STEAM and DRY IRON has all these advantages

- *Low Price* — only 59/6d. including accessories.
- *Controlled Heat and Steam for every fabric* and controlled heat when dry ironing.
- *Uses ordinary tap water*—hot or cold.
- *Easy maintenance*—descaling can be done at home in only two hours with the descaling fluid supplied.
- The famous MORPHY-RICHARDS features—'Magic Eye', Pilot Light, no T.V. or Radio interference, easy-grip, ever-cool handle and right or left hand thumb rest.

MORPHY-RICHARDS

Household Electrical Appliances

A POWER FOR GOOD IN THE HOME

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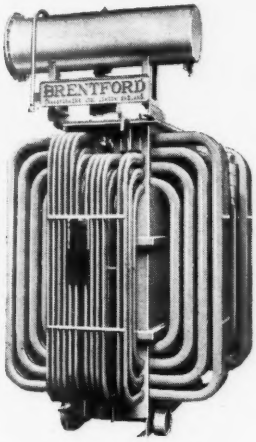
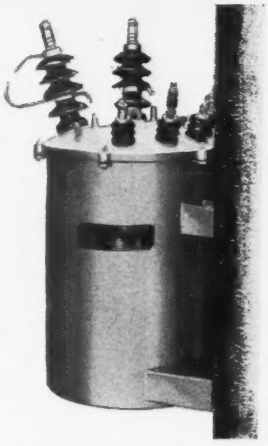
BRENTFORD

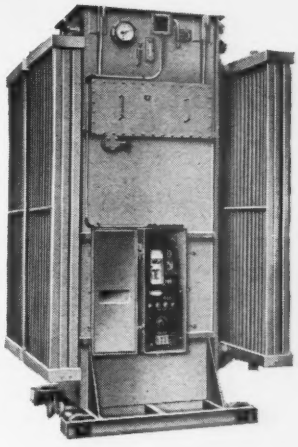
For the latest electrical developments in Voltage Regulators, Transformers and Heat Pumps



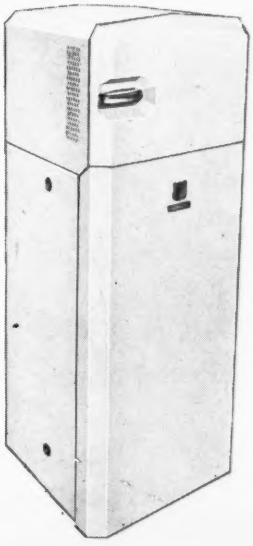
DISTRIBUTION TRANSFORMER
1250 kVA ratio 1100/400 volt, 3-phase



BRENTFORD "POLEMASTER"
15 kVA



REGULATING UNIT
Automatic Line Regulator 3270 kVA



BRENTFORD "DUO-THERM" Heat Pump

We are exhibiting during the British Electric Power Convention at Lawns Hotel, Hove

June 27th — July 1st

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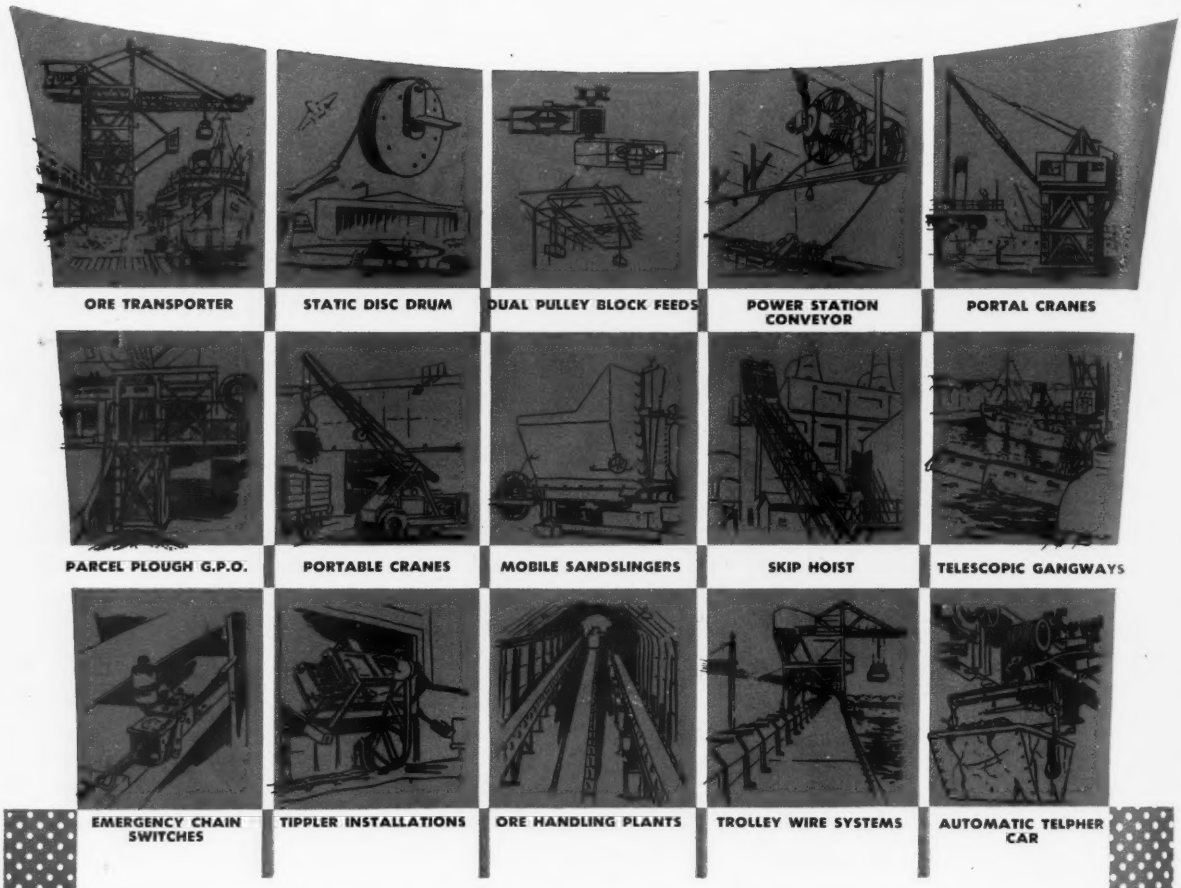
Tel.: LEE GREEN 1006-7-8. Telegrams: Broco, Blackvil, London. Cables: "Broco, London"



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Special Electrical Equipment for every class of Handling Plant.

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6,600 volt Reeling Drums for special applications.

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Grill Floors for Platforms and Mezzanine Floors, Steel Lattice Ladders, Patented Hand Railing, Grills for Coal Screens, Access Ladders with Convex Visible Edge Stairtreads, Window Cleaning Galleries, Trench Gratings, Duckboards, Servo Docks, Vehicle Washes, Scaffold Boards.

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TRANSFORMERS
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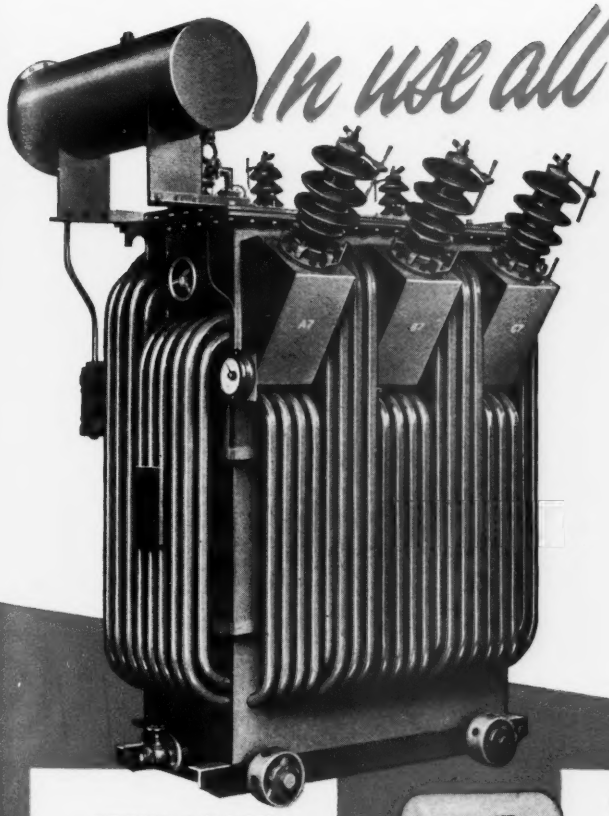
VOLTAGE REGULATORS
for
POWER-DISTRIBUTION

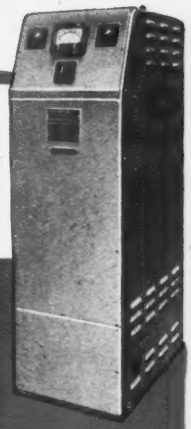
... all Industrial Requirements



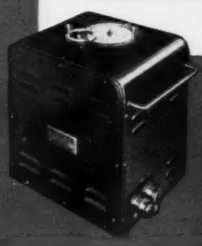
TYPICAL 1,000 kVA 33 kV POWER TRANSFORMERS

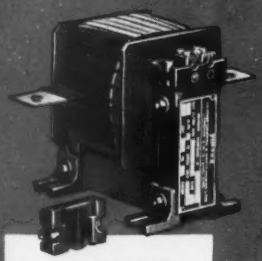
OIL TEST SETS
Portable set for testing Dielectric strength of oil and compound

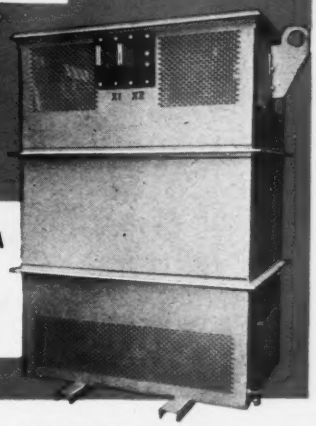
AUTOMATIC VOLTAGE REGULATORS



PHASE SHIFTING TRANSFORMERS







TEST EQUIPMENT
Primary Current Injection

INSTRUMENT TRANSFORMERS
Voltage and Current

TYPICAL 400 kVA
Single Phase
6.9 kV Dry Type
TRANSFORMER

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TR 3

One way and another

SANTON "BEAVER" IMMERSION HEATERS

can be fitted with either a stem type thermostat *or* the famous Santon 'Otter' fixed setting thermostat. This entirely new development now makes it unnecessary for suppliers to stock heaters for each type of thermostat, and makes it possible to fix the very best thermostat in its class and price range. "Beaver" Heaters are of the non-withdrawable element type (2¼" B.S.P.T.), and carry the usual Santon guarantee of quality of materials and workmanship.

SEE THEM ON STAND 59 B.E.P.C. EXHIBITION

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'ENGLISH ELECTRIC'

to build Britain's 200 MW largest steam turbo-generator

The CENTRAL ELECTRICITY AUTHORITY has awarded the Company the order for the first 200,000 kilowatt (270,000 h.p.) machine—twice the rating of the largest steam turbo-generator yet in use in Britain.

★ Won in direct competition, this order marks the first stage in the super power station which, subject to ministerial consent, will be built at High Marnham on the River Trent and is planned to add over one and a third million horsepower to the country's generating plant capacity. ★ Of some 270 C.E.A. power stations, only 24 produce more electricity than will come from this one machine alone! ★ This order is the outcome of the research, design and engineering resources which have already led to the installation of 'ENGLISH ELECTRIC' turbo-generators in so many up-to-date power stations throughout Britain and the World. To have secured it confirms once again the Company's international lead in the design and manufacture of large turbo-generators.

technical data

The 3-cylinder turbine and alternator will be directly coupled in line and will run at 3000 r.p.m., the turbine operating at 2350 p.s.i.g. and 1050°F. at the turbine stop valves, re-heating to 1000°F. at the intermediate pressure cylinder and exhausting to a single shell condenser operating at 28.7" vacuum with six stages of feed water heating to 460°F. The single alternator will be of the direct hydrogen-cooled type, generating at 16,500 volts and having a rated gas pressure of 30 p.s.i.g.

See also our Fusegear and Instruments advertisements in this issue.

THE ENGLISH ELECTRIC COMPANY LIMITED, QUEENS HOUSE, KINGSWAY, LONDON, W.C.2

Steam Turbine Division, Rugby

WORKS: STAFFORD · PRESTON · RUGBY · BRADFORD · LIVERPOOL · ACCRINGTON

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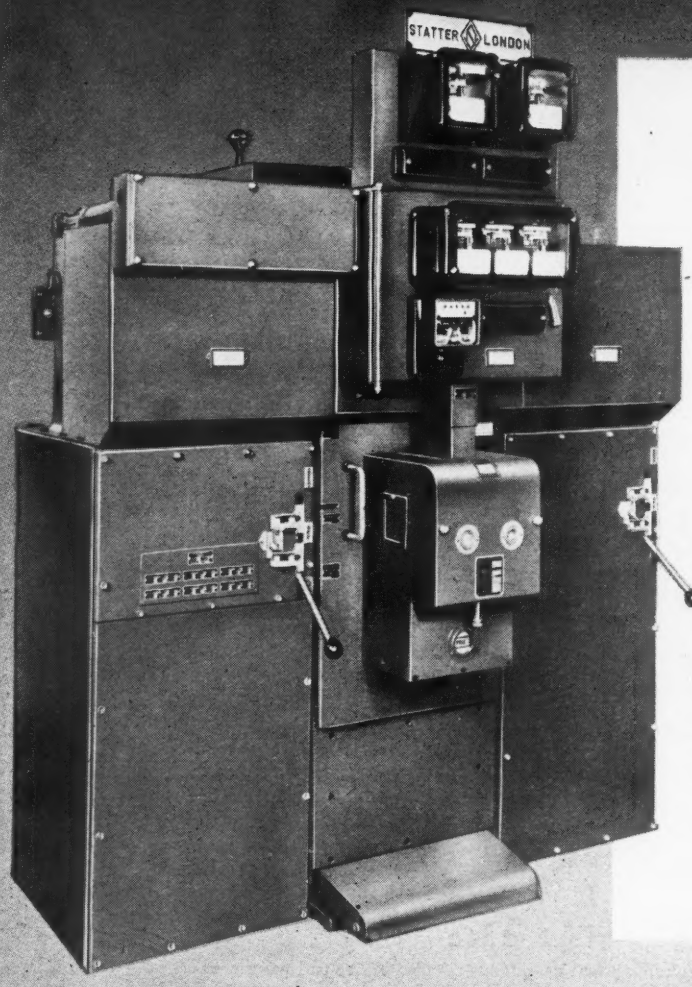
H.V. METALCLAD SWITCHGEAR

Air insulated up to 11kV



ASTA certified for breaking capacities up to and including 250 MVA at 6.6 and 11 kV.

Circuit Breakers, automatic fuse-switches and non-automatic fault-making load-breaking oil switches can be arranged in any combination.

Designed for Electricity Supply Authorities and Industrial Consumers to give safe and consistent operation with utmost reliability under all conditions of service in all parts of the world.

Switchgear similar to that illustrated is being supplied to equip 67 sub-stations for the Government of Malta Electrification Scheme.

Consulting Engineers - Messrs. Preece, Cardew & Rider.

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SELF-TAPPING SCREWS SCREW MACHINE PRODUCTS (SLOTTED &

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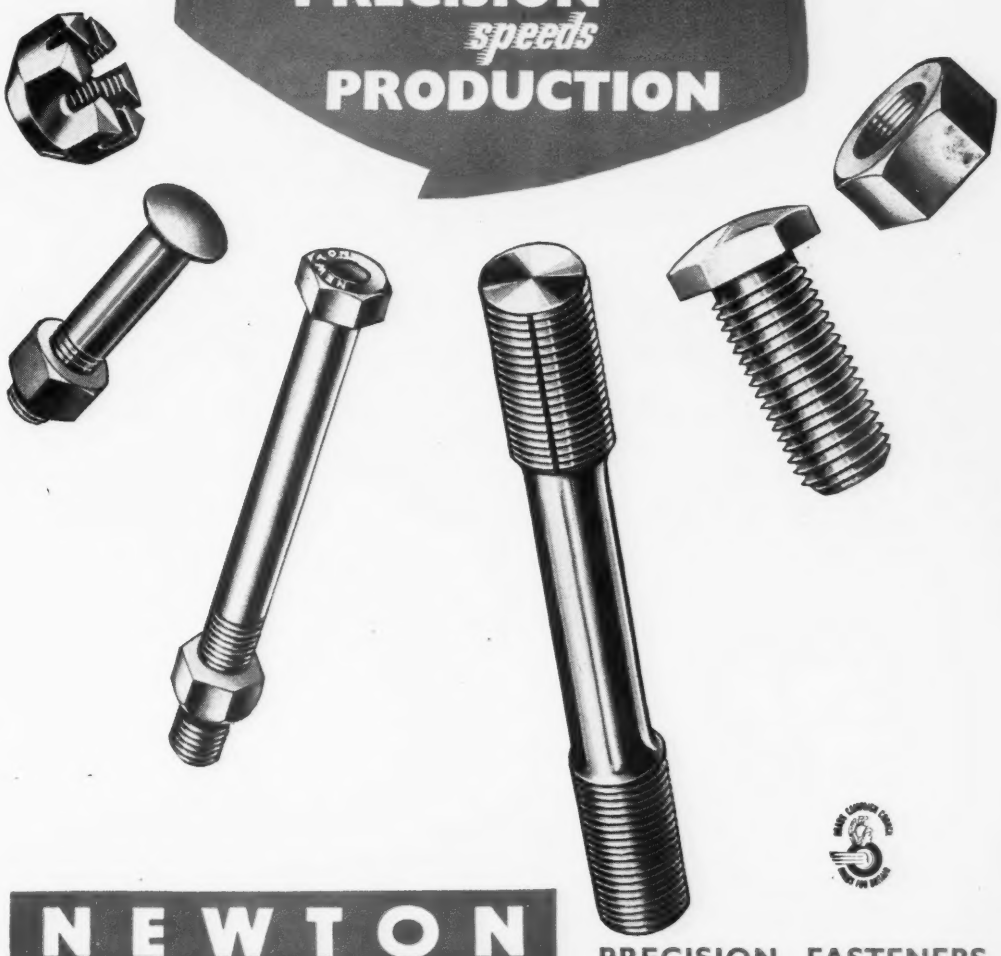
SELF-TAPPING SCREWS SCREW MACHINE PRODUCTS (SLOTTED & PHILLIPS RECESS) SMALL PRESSINGS

THE DESIGNER SAYS ...

TAKE IT FROM ME

PRECISION *speeds* PRODUCTION



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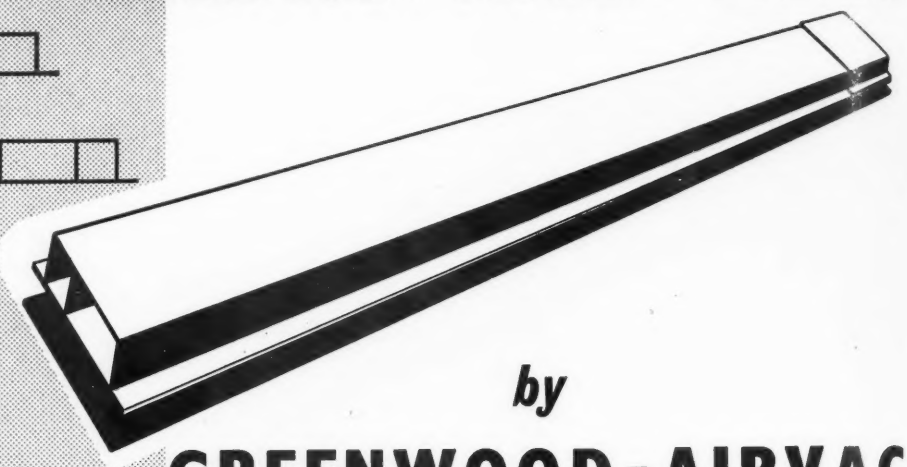
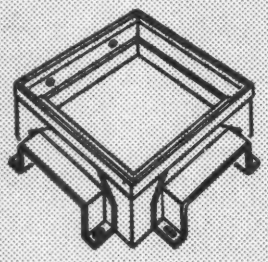
Represented in: SOUTH AFRICA, NEW ZEALAND, INDIA, SOUTH AMERICA, DENMARK, NORWAY, HOLLAND, CEYLON and all MIDDLE EAST COUNTRIES

IMPROVED UNDERFLOOR CONDUIT SYSTEM



by

GREENWOOD-AIRVAC



For depths of screed 1½" and over

Rustproofed all-metal construction

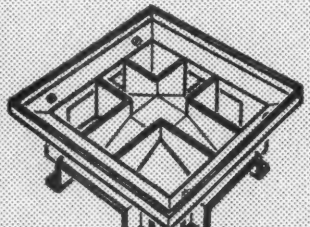
Sizes from 4"×1" to 12"×1½"

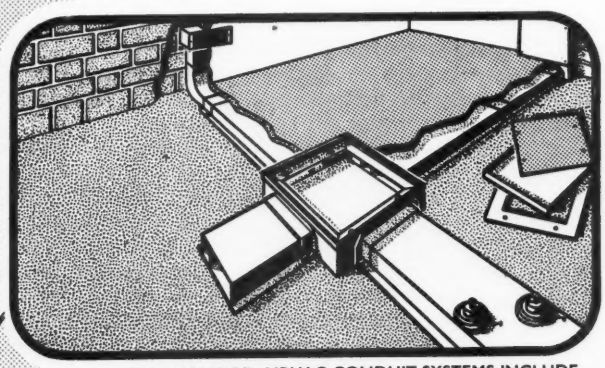
Single or multiple divisions

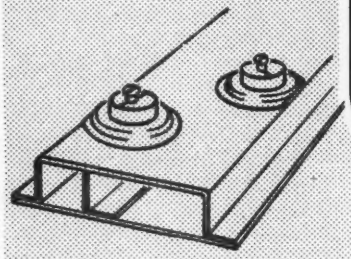
One-way or multi-way junction boxes

Flyover separators if required

Floor outlets for future connections







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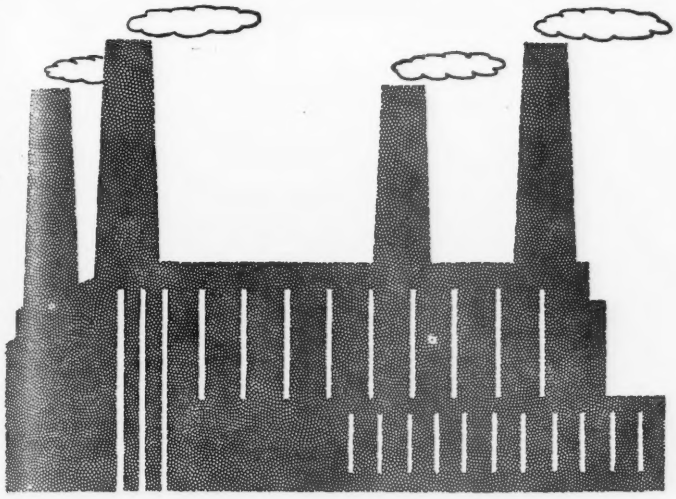
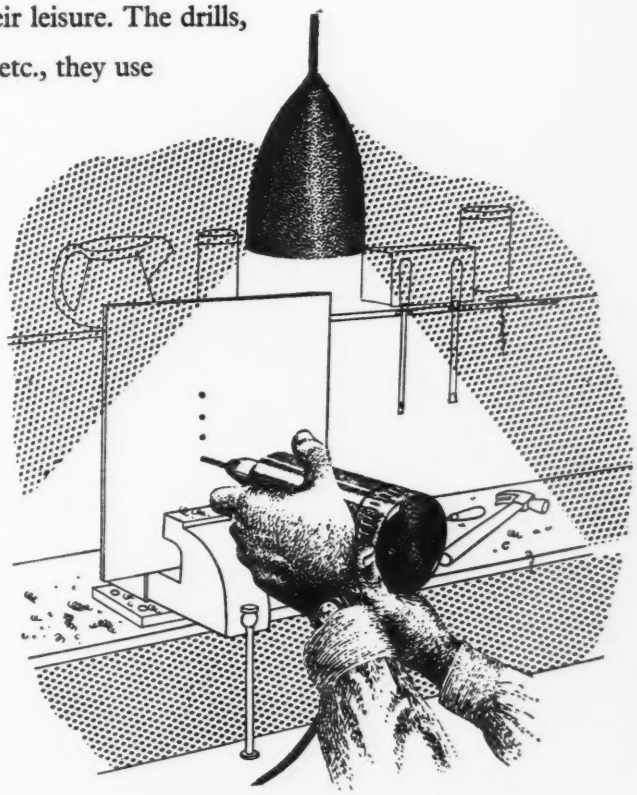


what is the connection?

In millions of homes, workshops and garages, men and women employ many and varied power appliances to ease and speed their work and increase their leisure. The drills, lathes, sanders, polishers, cleaners, mixers, etc., they use depend on electricity for their power.



AWCO Conductors provide the vital link between source and consumer. All-Aluminium low tension (240-415 volts) distribution lines supply the needs of these small users most efficiently and economically. Because aluminium conductor is up to 50% less in cost than its copper equivalent, erection is less expensive. Being half the weight of copper, aluminium conductors are easier to transport, handle and erect.

Industry and people depend on electricity—

electricity depends on Aluminium.

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ALUMINIUM WIRE & CABLE CO. LTD.

Britain's Largest Manufacturers of Aluminium Wire and Conductors

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A seven point winner - smart appearance (with attractive stove enamel finish) - full size adjustable power wringer - power pump drainer - castors for easy movement - special Swirlux agitator - large capacity tub.

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The perfect small washing machine - heats the water - 6 lb capacity - 12 inch fold-down hand wringer - special Swirlux agitator (non-heated version Type 500 also available)

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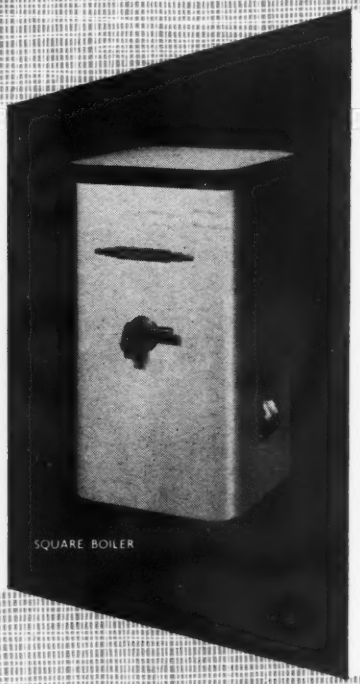

SQUARE BOILER

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ROUND BOILER

Obtainable in Galvanised finish as shown (a most durable finish of special appeal for Corporation and other housing schemes) or in cream stove enamel.

SQUARE BOILER

This smart and compact boiler is fitted with castors for easy movement and is finished in cream stove enamel. The table-top in cream vitreous is an attractive feature.

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FULLEDGE WORKS · BURNLEY · LANCS. *Telephone 3121 and 3203*

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QUICK-WIRING ACCESSORIES

Here are two NETTLE Favourites

to Save you Time and Money

Reference Nos. 22 & 23. Combined Blocks and Ceiling Roses available in brown or white, 2 or 3 terminals.

Write today for the New NETTLE Wall Chart.

These combined block and ceiling fittings are always in heavy demand by contractors everywhere, to speed installation and cut costs. The usual wooden block is dispensed with and this combined unit can be fitted accurately in seconds. All types have porcelain interiors with pillar terminals and 2" screw centres as standard.

Reference Nos. Y62 & Y63. Combined Block and Battenholder available in brown or white, 2 or 3 terminals. Also with H.O. skirt.

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HARPER ROAD · WYTHENSHAWE · MANCHESTER

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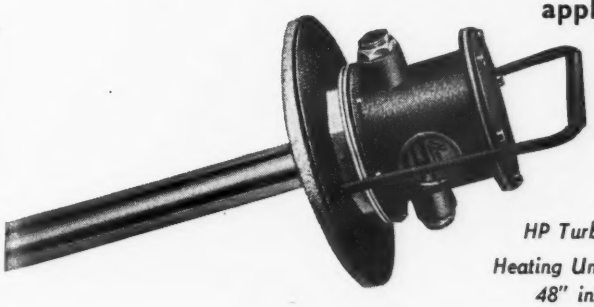
Backer

TUBULAR SHEATHED HEATING ELEMENTS

are suitable for the majority of heating problems – here is one of many applications



HP Turbine Bolt Heating Unit 5·25 kW. 48" insertion.

Our business is solving heating problems — can we help you?

BACKER ELECTRIC COMPANY LIMITED
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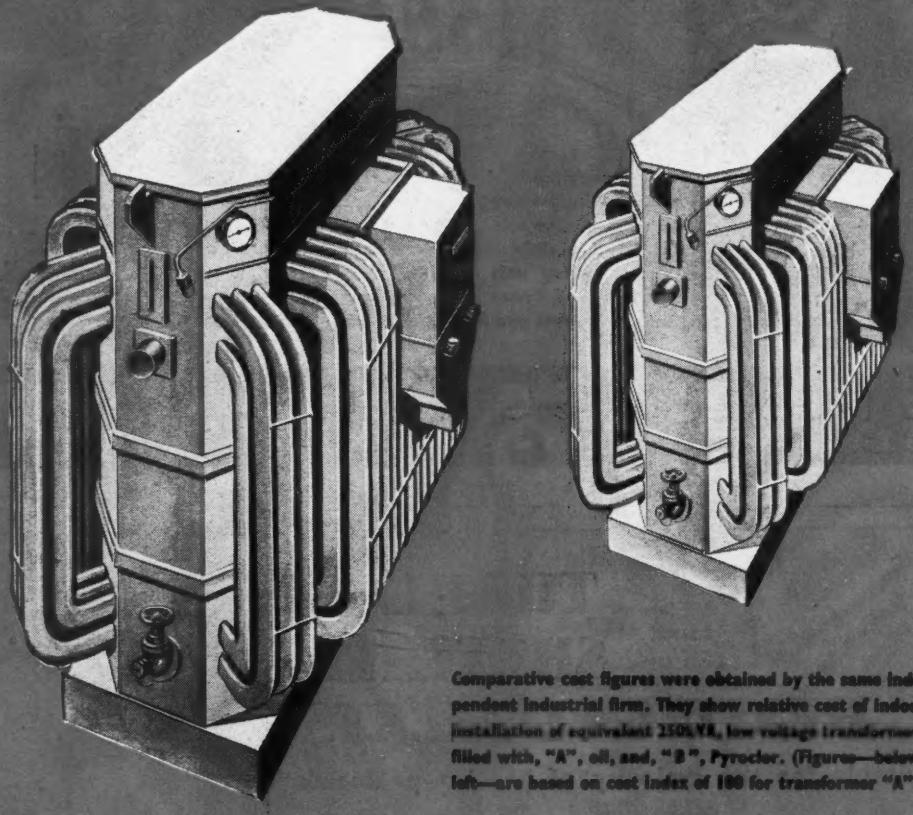
See how Pyroclor can cu transformer costs!



Comparative cost figures were obtained by the same independent industrial firm. They show relative cost of indoor installation of equivalent 250kVA, low voltage transformers filled with, "A", oil, and, "B", Pyroclor. (Figures—below, left—are based on cost index of 100 for transformer "A".)

	Transformer "A"	Transformer "B"
Transformer 250 kVA	100	130
Foundations	14.5	6
Fire protection equipment	51	Not required
Total cost	165.5	136

These figures speak for themselves. Pyroclor filled transformers not only offer greater security against fire hazard, but they may make economies possible in a completed installation. In the example quoted above, the installed cost of the Pyroclor filled transformer was 18% less than its oil filled counterpart.

Pyroclor can now be delivered to you in bulk. Write for full information.

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182 Victoria Station House, Victoria Street, London, S.W.1

and at Royal Exchange, Manchester, 2.

In association with: Monsanto Chemical Company, St. Louis, U.S.A. Monsanto Canada Limited, Montreal. Monsanto Chemicals (Australia) Ltd., Melbourne. Monsanto Chemicals of India Ltd., Bombay. Representatives in the world's principal cities.

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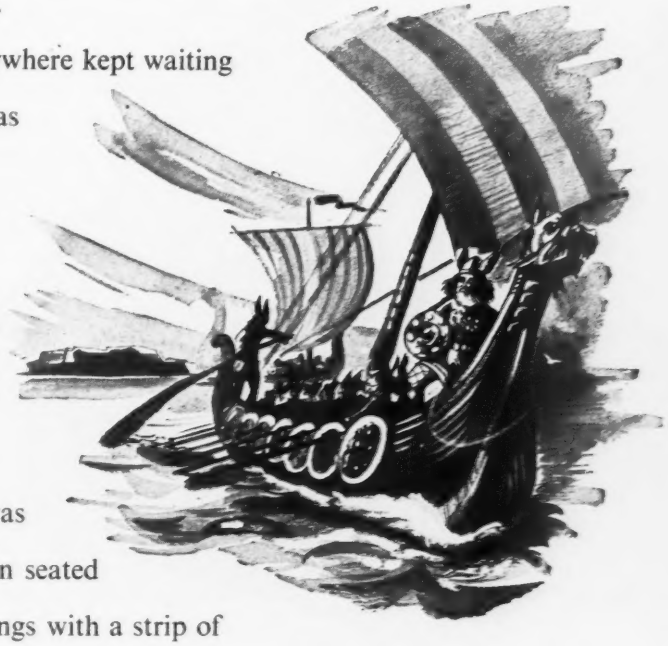
NORDIC SAGA

Viking Exploration

To cross the Atlantic in a small sailing boat, with only outboard oar power was a great adventure unsurpassed in its kind in the centuries that have since passed.

The Vikings' shields and weapons as well as many ornaments and utensils made of copper alloys put them more or less on level terms with their Mediterranean or Eastern contemporaries.

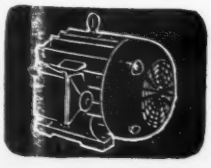


What was everywhere kept waiting for discovery was the efficient drawing of copper or brass wire. Even in Elizabeth the First's time it was done by two men seated opposite on swings with a strip of brass gripped in tongs. Machines worked by water power were imported towards the end of her reign to bring a considerable advance in efficiency.

Britain has always set the world standard in cable and wiring.

ANACOS REGD.

RODS · WIRES · STRIP · STRANDS · SECTIONS AND FORGINGS FOR ELECTRICAL PURPOSES TO STANDARD SPECIFICATIONS OR SPECIAL REQUIREMENTS



FREDERICK SMITH & CO.

Manufacturers of Anacos Bare Copper Conductors.

ANACONDA WORKS · SALFORD 3 · LANCS

Incorporated in The London Electric Wire Company and Smiths Limited.
Associated with The Liverpool Electric Cable Co. Ltd. and Vactite Wire Co. Ltd.

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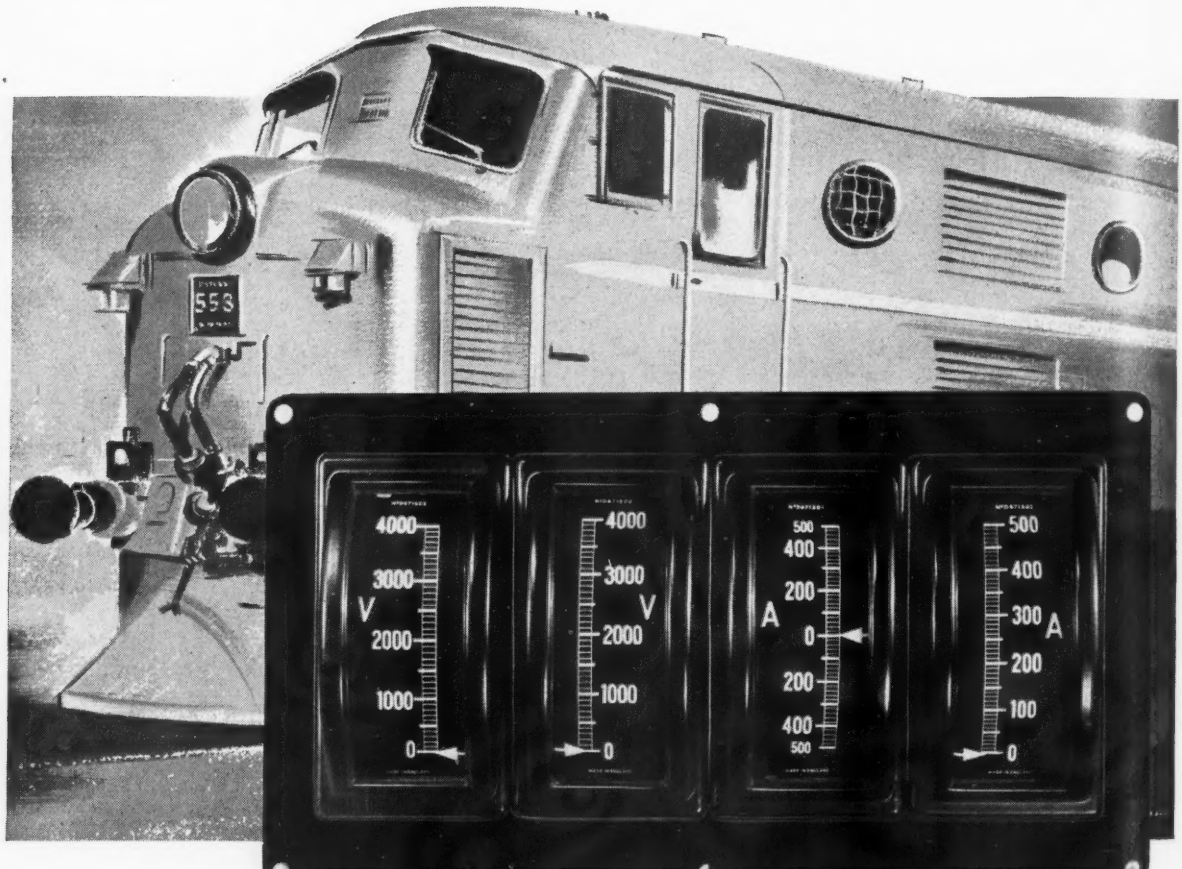
ELLIOTT

Edgewise Ammeters and Voltmeters



—DESIGNED TO WITHSTAND *HARD TREATMENT*

Elliott Edgewise Ammeters and Voltmeters were developed to fulfil the exacting requirements of rail traction applications. Exceptionally robust, they have been proved in service under the most arduous operating conditions.

These 4″ scale moving coil instruments are now available for industrial applications in D.C., Rectifier, Thermo-couple and Galvanometer types in a wide variety of standard ranges. *Send for full details.*

D.C. INSTRUMENTS (SELF-CONTAINED)
Voltmeters 10 mV. to 300 V.
Ammeters 100 μA. to 15 A.

RECTIFIER INSTRUMENTS (SELF-CONTAINED)
Voltmeters 10 V. to 750 V.
Ammeters 250 μA. to 50 mA

THERMO-COUPLE INSTRUMENTS (SELF-CONTAINED)
Ammeters 10 mA. to 10 A.

GALVANOMETERS (MINOR SCALE)
Microammeters 50-0-50 to 500-0-500 μA.

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Vitastic is made of a fine quality chrome leather with a thin, ungiving, unstretchable plastic interlay. Its flexibility and low weight ratio makes speeds possible of 9,000 r.p.m. and contrariwise, it is equally efficient at slow speeds. The chrome leather has tremendous gripping power and the plastic centre allows the belt to be so thin that it is far more flexible than ordinary belting, is lighter in weight and more economical to operate yet loses nothing — in fact it gains — in tensile strength.

Higher speeds : lower speeds : shorter centres : longer centres : higher ratios : smaller pulleys : lighter operating ratios : use of narrower widths : less power consumption : less centrifugal force losses : reduced overheads : less maintenance . . . there is nothing to touch Vitastic.

Ask for samples and details of this new and better belting to be sent you.

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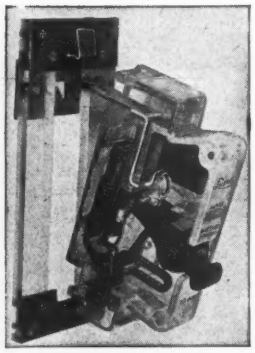
The latest development in miniature **CIRCUIT-BREAKERS**



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BARE COPPER BRAIDS NON-RUBBER FLEXIBLES

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"BROODAWAY" UNITS

by METWAY PRODUCTS

For Poultry and Pig Rearing

INFRA-RED DULL BURNERS

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Bright types also available.

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"I'm opening the door to carefree cooking for housewives"

that means generous profits with fewer maintenance worries for YOU

Never before such a cooker!

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Available in three colour combinations:
CREAM with BLACK HOB
WHITE with BLACK HOB
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HEAT-RESISTING BLACK BAKELITE HANDLES of new improved design.

See this cooker displayed on Stand No. 57, B.E.P.C., Brighton, June 27th-July 1st, together with the new **REVO REGENT** cooker and other Revo domestic appliances.

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All over the world you'll find Conduit and Fittings by

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METALLIC

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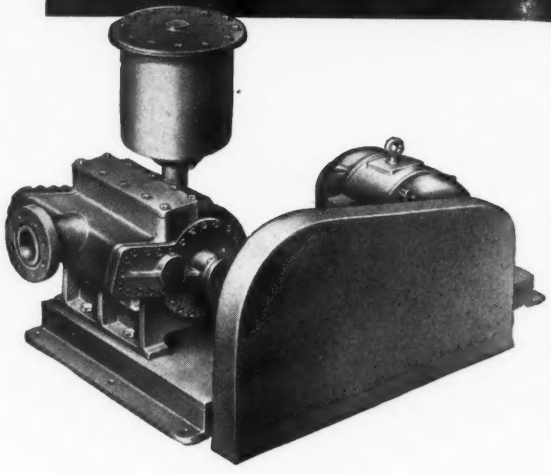
and at London, Newcastle-on-Tyne, Leeds, Swansea & Glasgow.

Kinney HIGH VACUUM PUMP

Gas Ballast Type



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The Kinney D.V.H. 8810 (KDH.120) Gas Ballast High Vacuum Pump has been re-designed and now incorporates improved features for speedier and cheaper production processing in the manufacture of electric lamps, mirrors, coated lenses, cathode ray tubes, foodstuffs, drugs, coated foils and electrical components. The suction end is now arranged for horizontal instead of vertical suction, and has a flanged connection of increased bore instead of threaded type. A mechanical shaft seal now replaces the usual stuffing box. The overall height of the pump has been reduced and the lower centre of gravity permits higher operating speeds with reduced vibration resulting in a displacement of 130 cu. ft. per minute. Further technical details gladly supplied on request.

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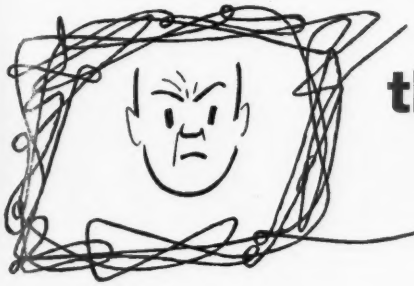

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PONDER IT!

DISCUSS IT!

then hand it on to

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LAMPHOLDERS

suitable for every type of installation

CORD GRIP

CONDUIT SCREWED

WATERTIGHT

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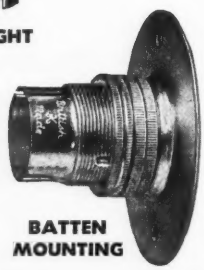
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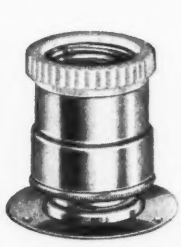
EDISON SCREW ANTI-VIBRATION

B.C. ANTI-VIBRATION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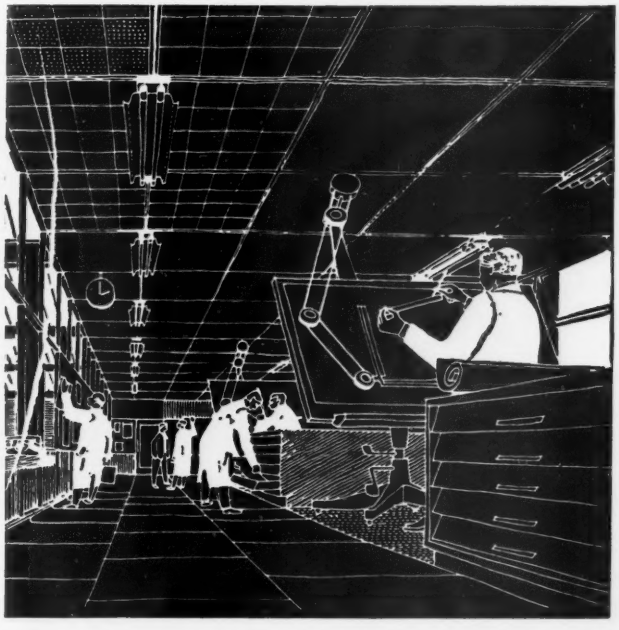
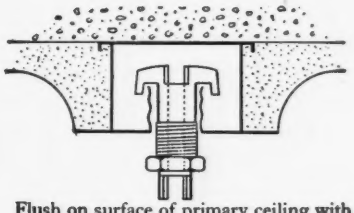
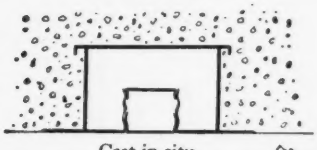
The New 'Invertrunking' by Mazda

Supports conventional ceiling boards in suspended ceiling.

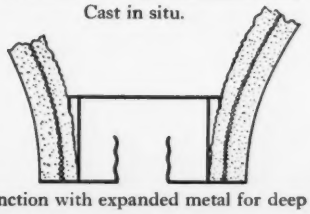




Flush on surface of primary ceiling with shallow plaster cove.



Cast in situ.



In conjunction with expanded metal for deep coves.

This new extruded aluminium cable-conduit has been designed to carry lighting fittings, electrical fixtures and cables. It supports ceiling boards, and can be built into structural ceilings.

Wiring can be laid in the Invertrunking after the ceiling is in position — even after it is decorated — and easily altered from time to time.

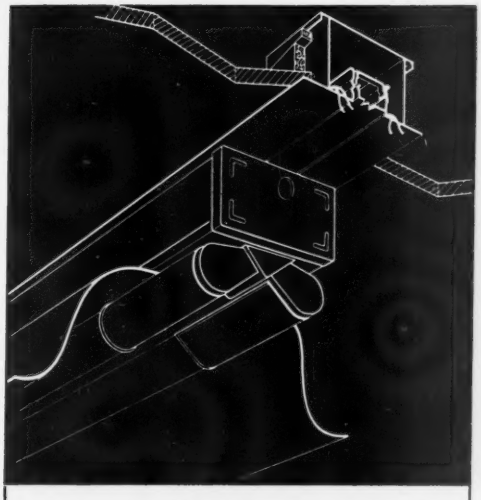
Invertrunking is jointed by aluminium channel sections, and there are Angle, Tee and Crossover pieces.

Literature on application

Wiring features

- ★ **New 'Parablock' connector permits rearrangement of lighting layout and changes of fitting, without altering main circuit wiring.**
- ★ **Special ¾" conduit Tee bolts support lights and other fittings, directly or on chain or conduit.**
- ★ **Takes any Mazda fluorescent or tungsten lighting fitting and other electrical equipment, such as clocks, loudspeakers, etc., provided with ¾" conduit fixing.**

'Invertrunking' is a Registered Trade Mark (Patent App. No. 34581/53)



Mazda F1160
Fluorescent Fitting with Invertrunking.

Mazda welcome you to Stand No. 55

at the B.E.P.C. Brighton 27th June — 1st July

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—Increases Light Output Ratio 10-15%

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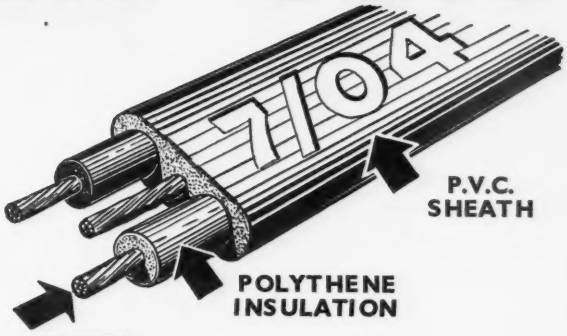

SAVE ON MATERIAL

ASHATHENE is a tough yet flexible cable with tinned copper conductors insulated with polythene The cores are colour coded in accordance with B.S.S. and I.E.E. requirements to provide ready identification. Thanks to the p.v.c. sheathing the cable may be embedded in plaster or cement without any deterioration occurring. Armoured ASHATHENE cables are also available for power wiring and provide that extra mechanical protection usually required in factory installations.

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ASHATHENE is already established as cable which enables a safe and permanent electrical installation to be made in less time and at lower expenditure. Time spent on conduit bending and screwing may be eliminated since ASHATHENE readily cleats into position along girders, walls, etc. ASHATHENE is easily manipulated and strips cleanly and quickly. You are invited to send for leaflets and technical data which deal with electrical and mechanical characteristics and notes on wiring methods. ASHATHENE is manufactured to B.S.S. 1557 in the types where this specification is applicable.

ASHATHENE IS COMPETITIVELY PRICED THROUGHOUT THE WIDE RANGE OF ARMOURED AND NON-ARMOURED TYPES

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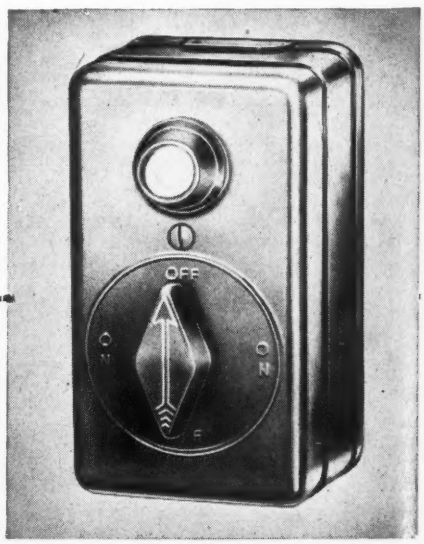

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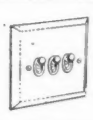
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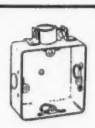
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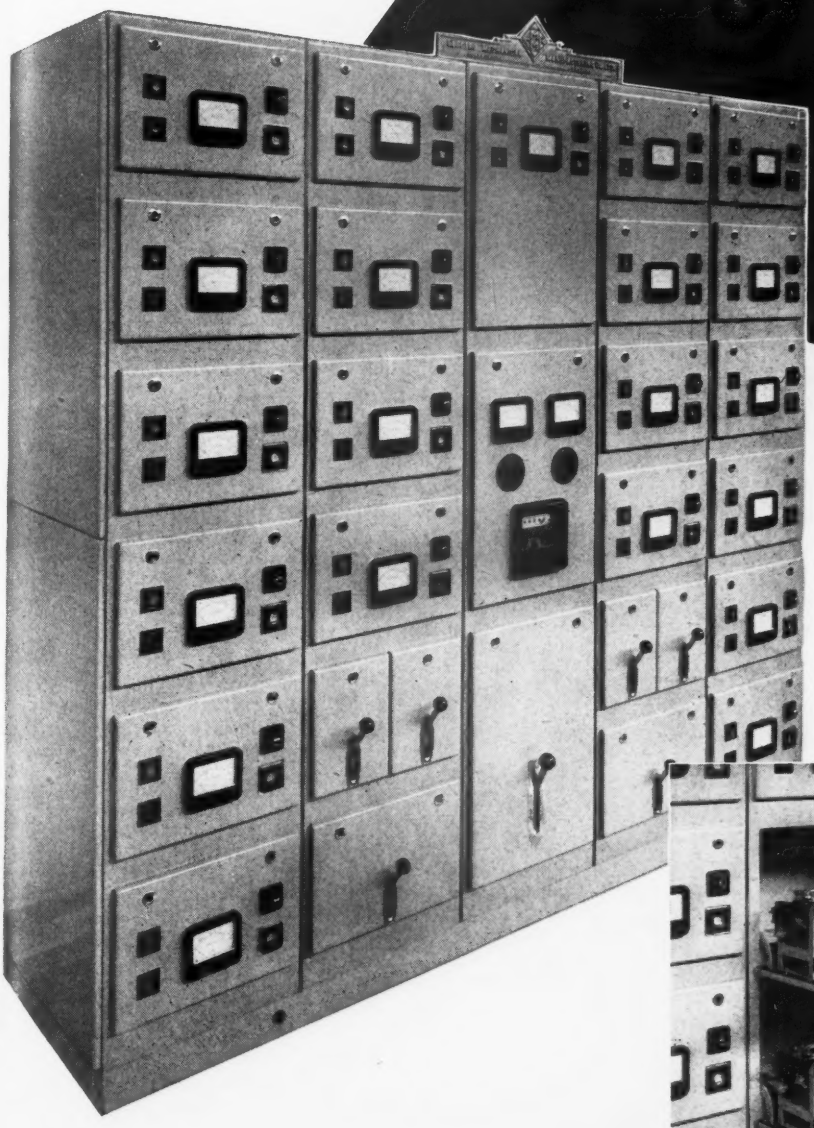

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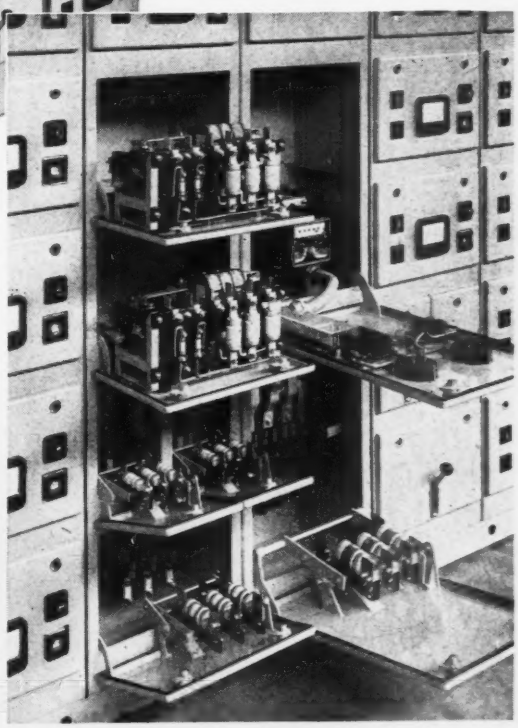

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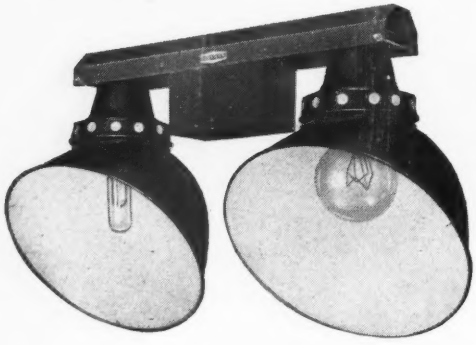

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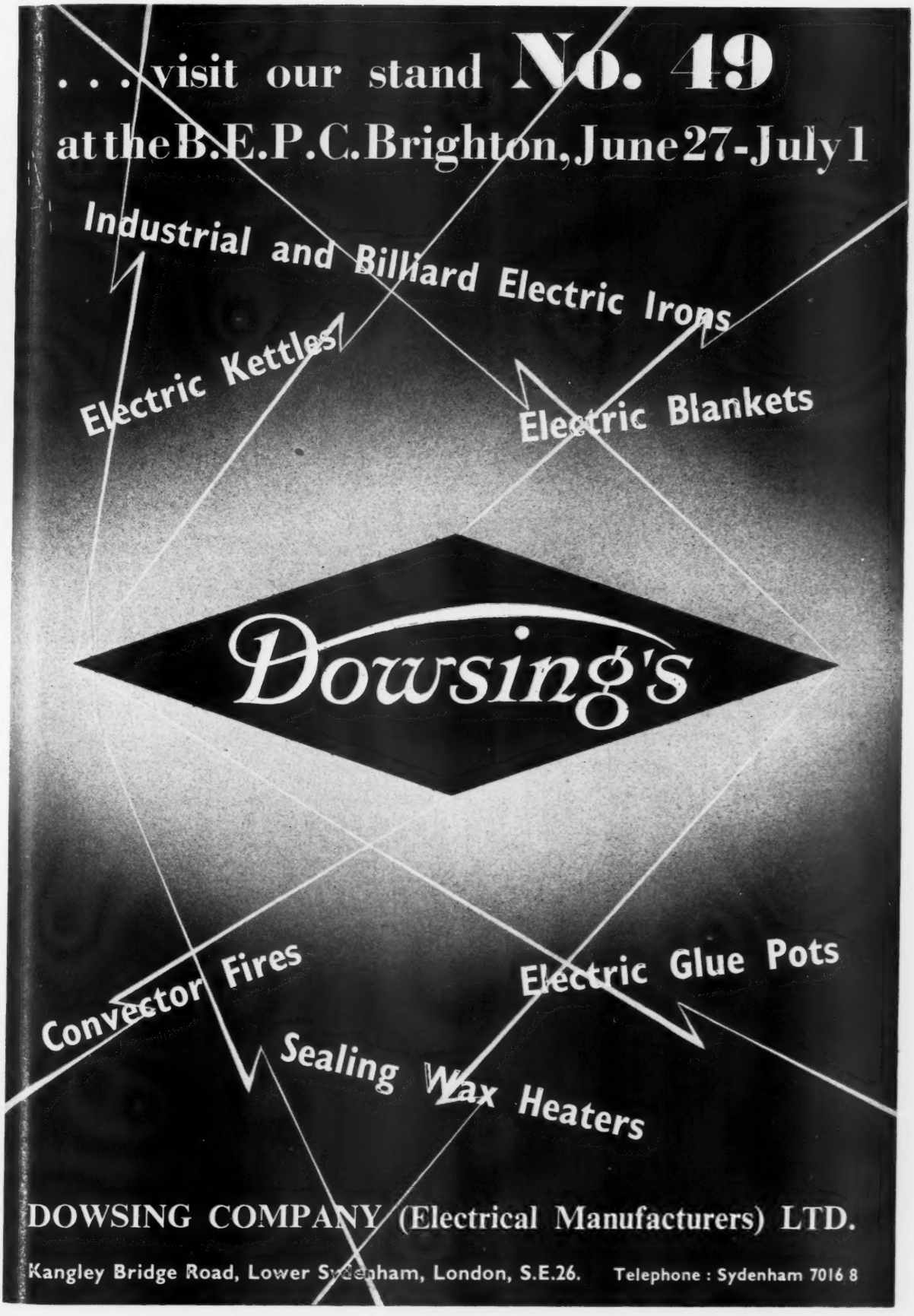
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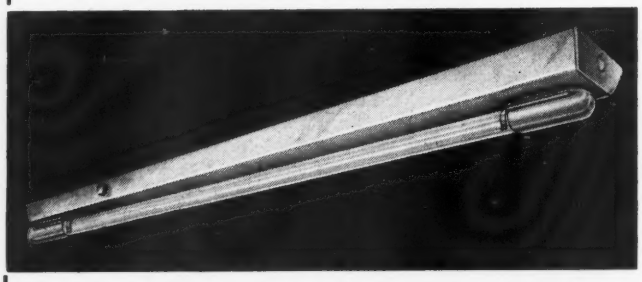

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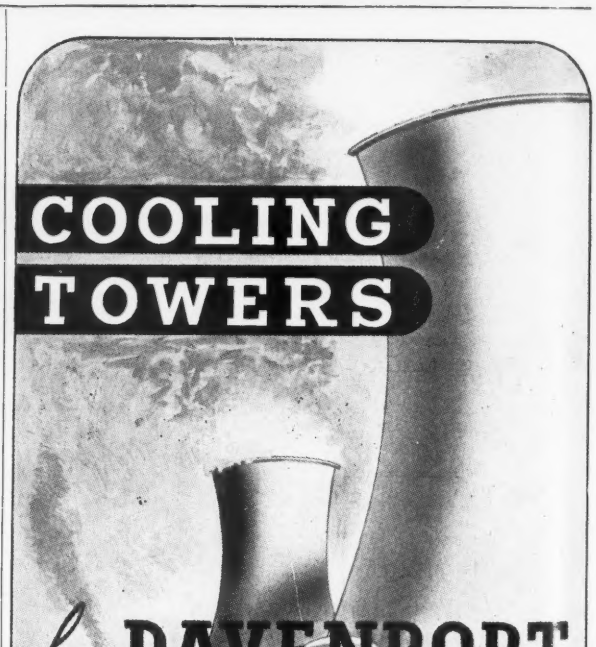

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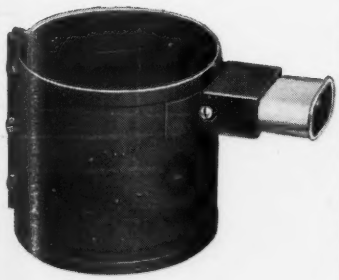

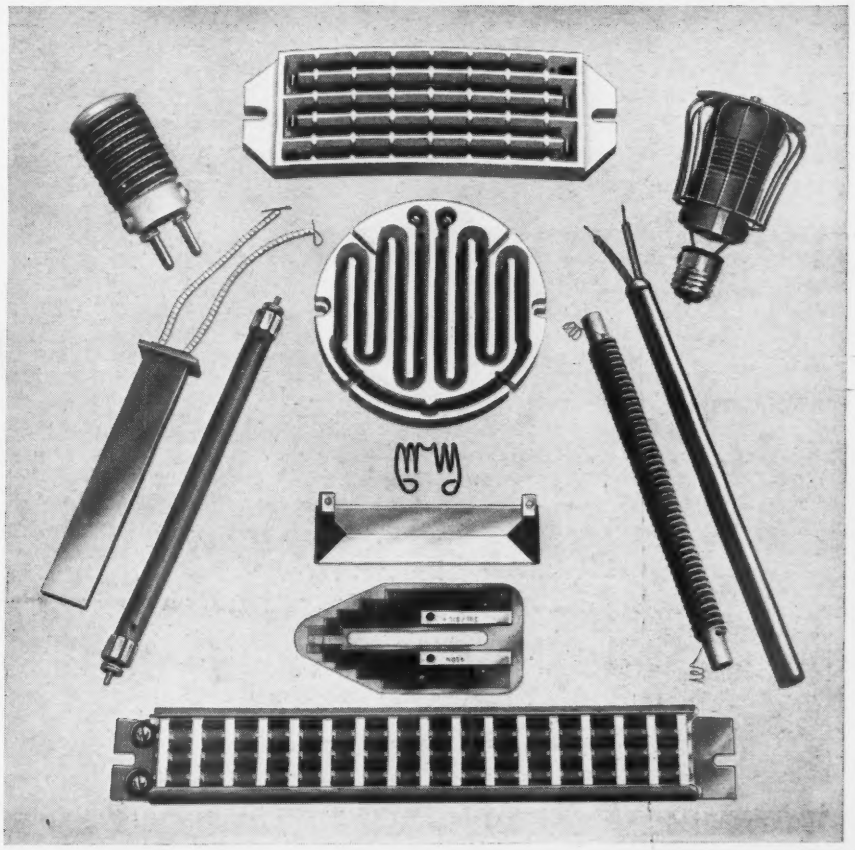

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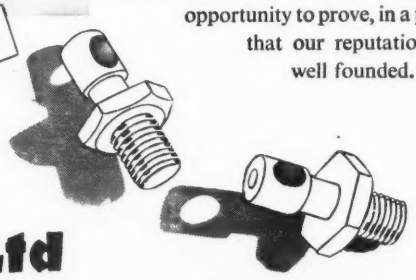

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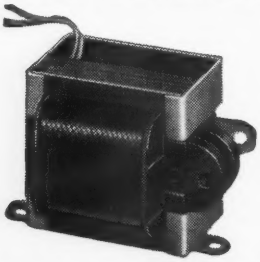

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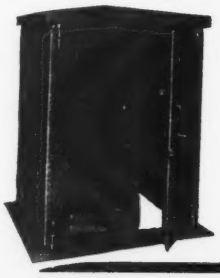

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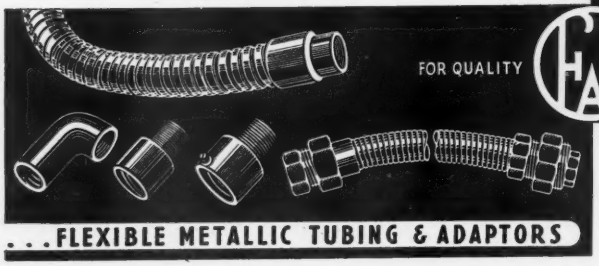

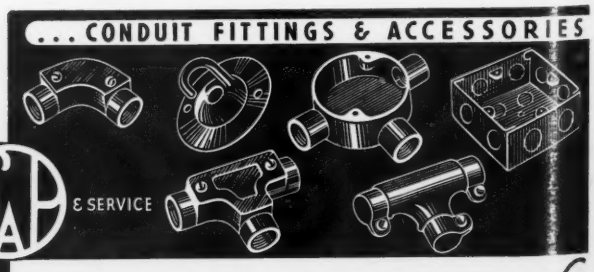

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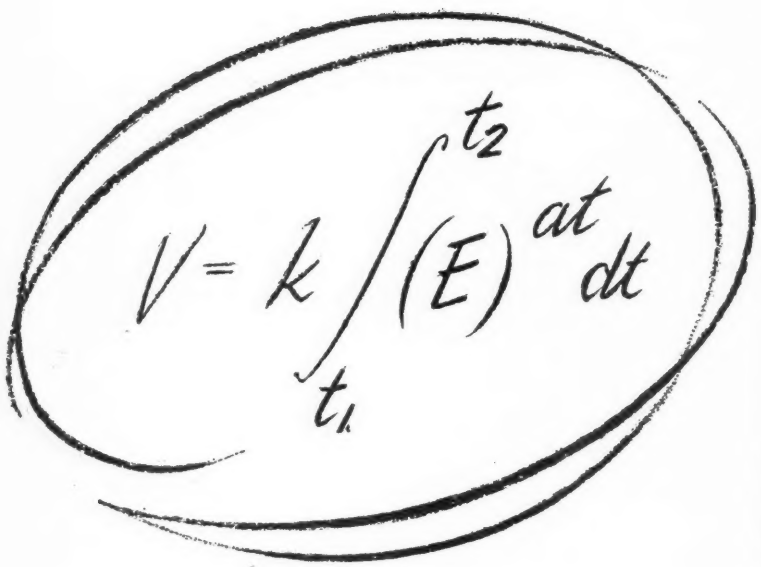

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When :

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E = *Experience*

a = *Ability to learn*

t = *Time*

k = *Constant helpfulness*

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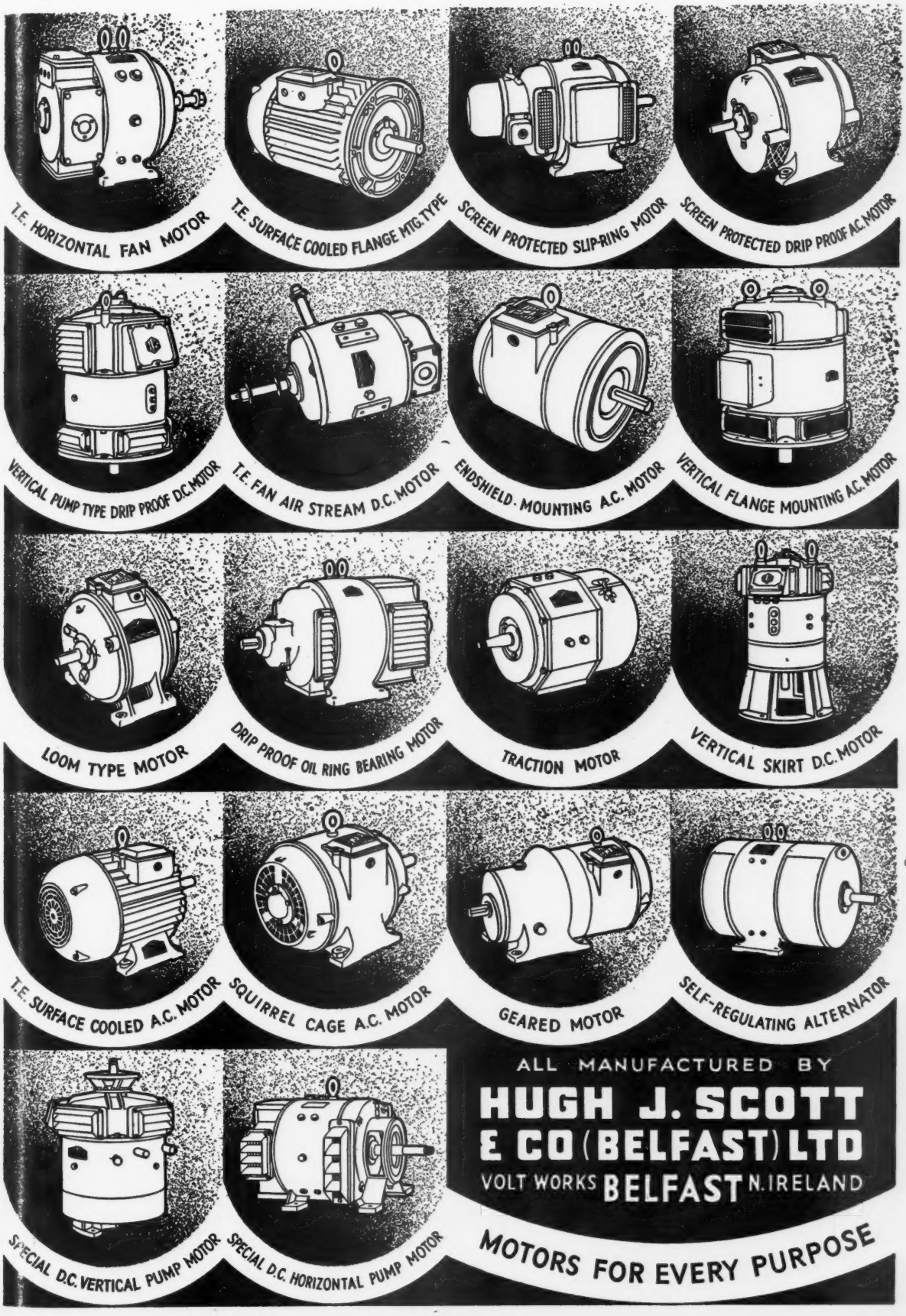
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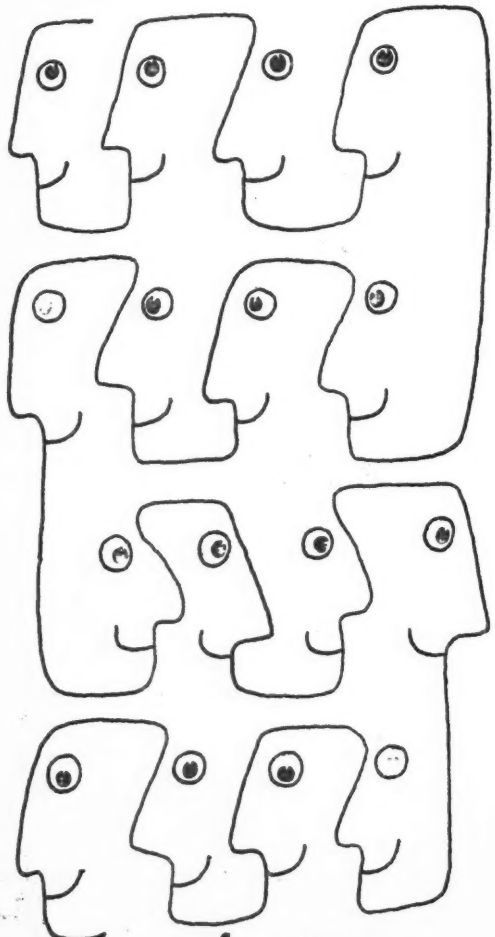

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Manufactured in S. Africa by
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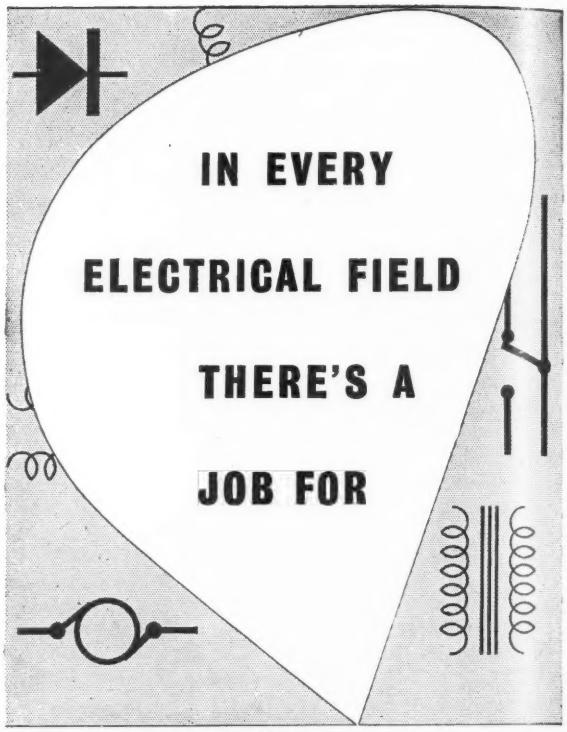

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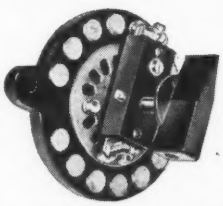
15-WAY ROTARY SWITCH



Adjustable from 1 to 15 way

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15 amp. – 30 amp.
S.P. – D.P. – T.P.

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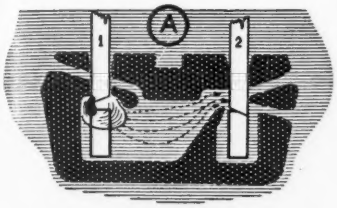
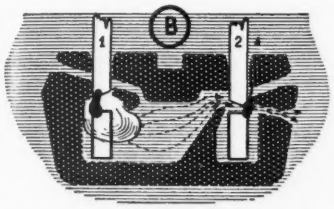
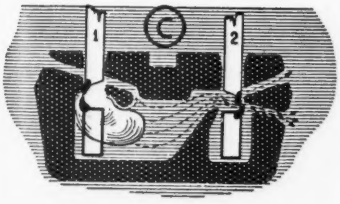


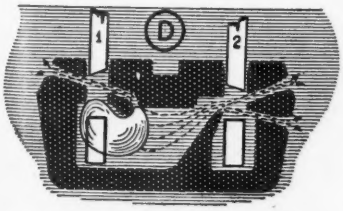
No. 1 electrode leads by ¼ cycle. Pressure trapped except for constricted relief at No. 2 in advance of arc.



No. 2 electrode breaks contact. Arcing restricted and displaced by pressure.



Arc severed at current zero by high pressure clean oil.



Arc-trap scoured by exhausting pressure and rapidly refilled with clean oil.

WE INVITE YOU TO SEE THE
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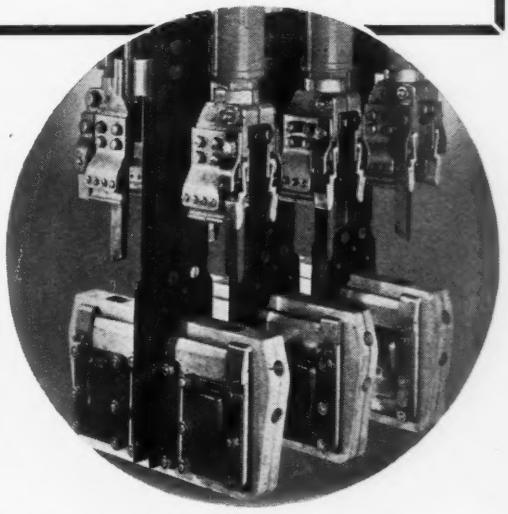
"CATON" ARC TRAP CIRCUIT BREAKER
on our
STAND No. 81
at the B.E.P. Convention, Brighton
27th JUNE — 1st JULY, 1955



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Our new IVI 13 metalclad unit is fully short circuit tested and embodies many outstanding features in compliance with the latest requirements, whilst retaining the well proved IVI principles.

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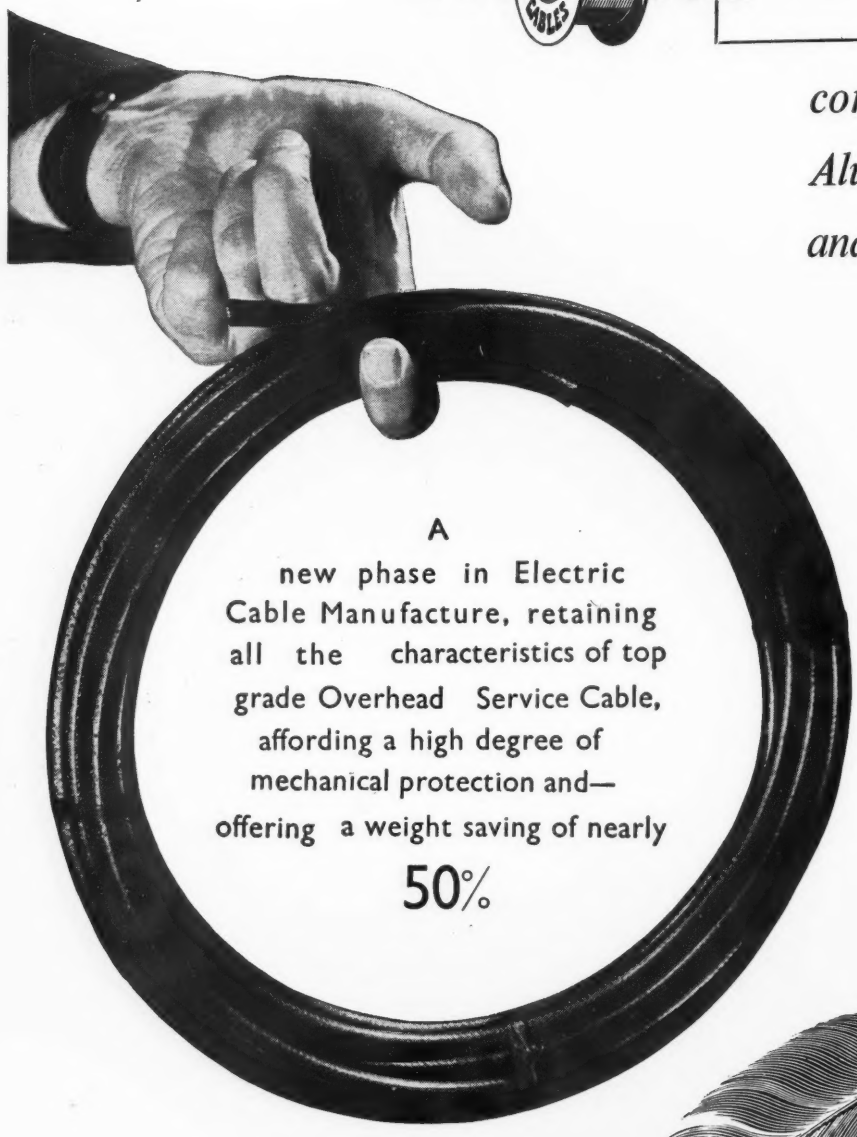

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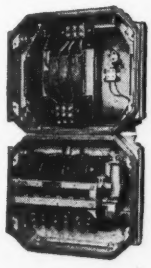
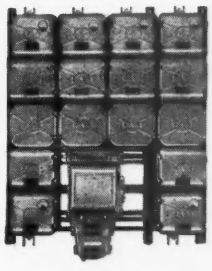
in IRONCLAD ENCLOSURES



A triple pole 30 amp. Circuit Breaker with core balance transformer and E.L. relay



A typical multi-way 15 amp. board with instruments. Individual panel isolators also available.

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Refer to Page 22 "Electrical Accidents and other causes 1952" M o L Form 929

INCORPORATING AUTOMATIC CIRCUIT BREAKERS IN EACH OUTGOING WAY

UNIQUE for its Core Balance Leakage protection.
UNIQUE as an Ironclad distribution with automatic protection for normal overloads and short circuits.
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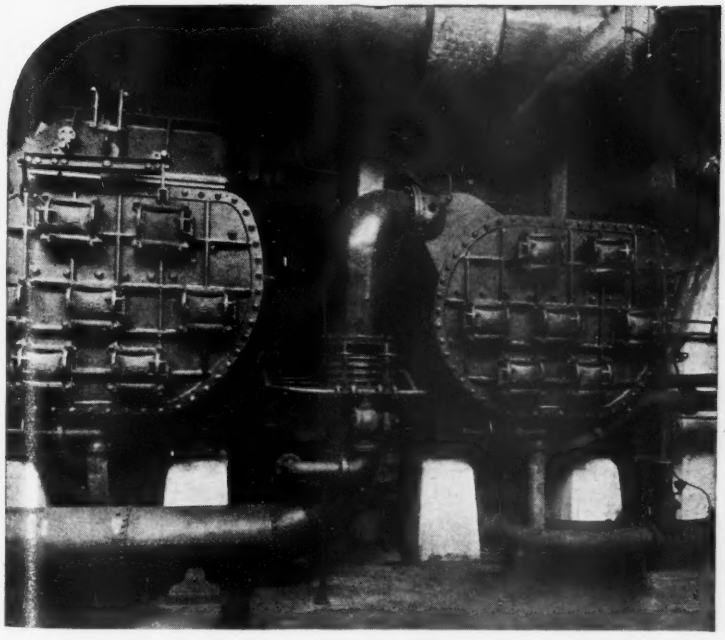

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In Association with Bryce Electric Construction Company Ltd.

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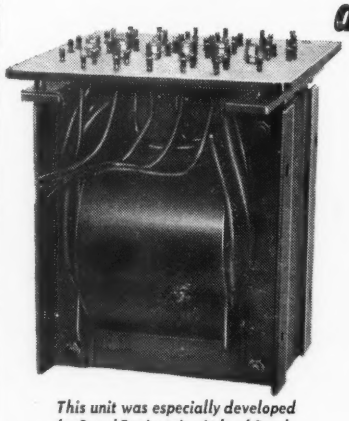

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SHORT RUNS OF HIGH QUALITY COMPONENTS

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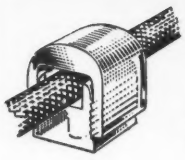

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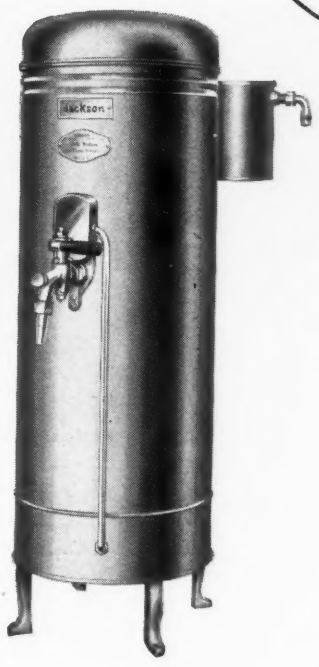

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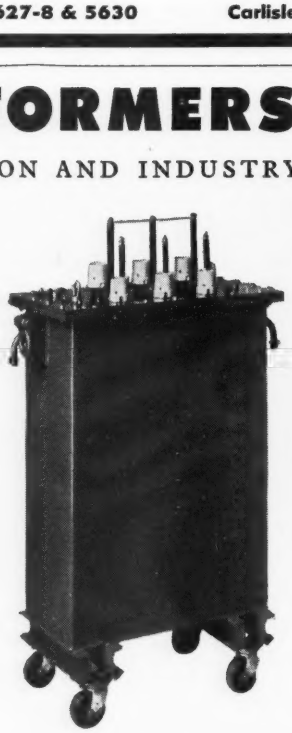

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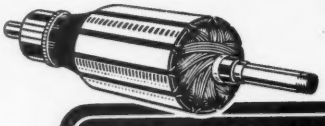

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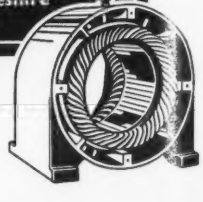

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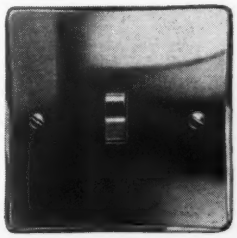

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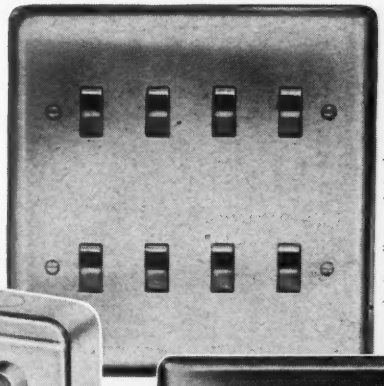

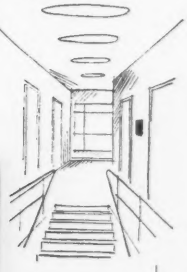

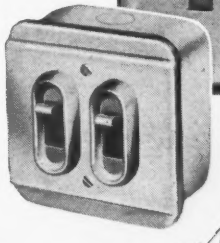

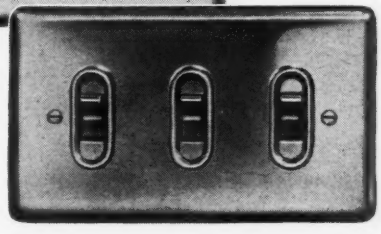

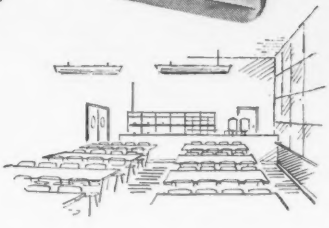

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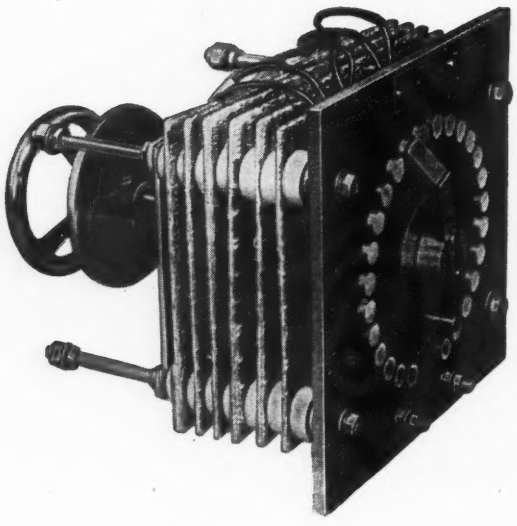
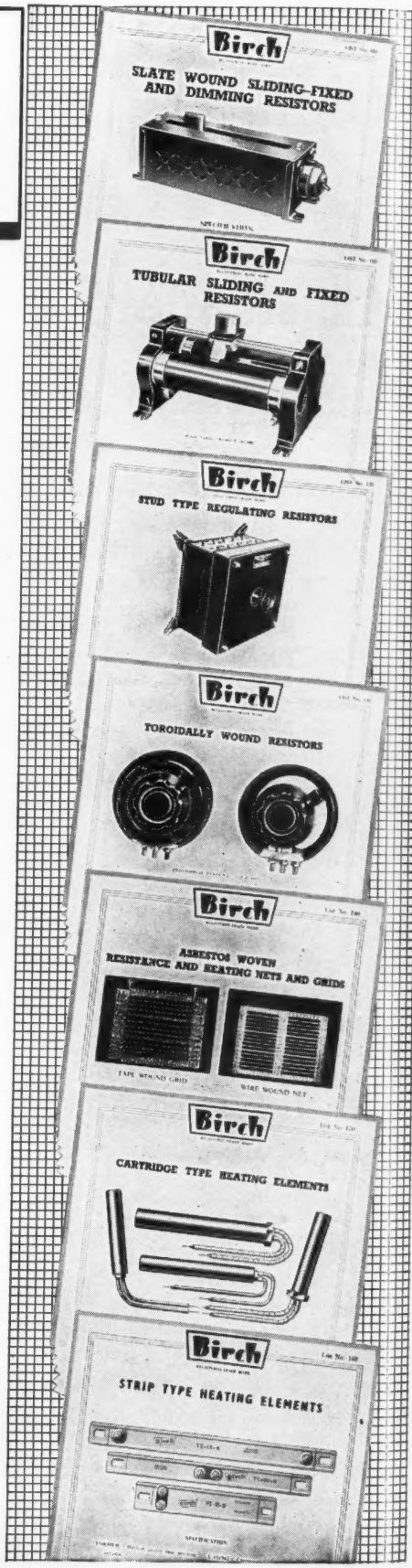


STUD TYPE RESISTOR
BACK OF BOARD REVERSED
OPEN TYPE MODEL B.R.O.



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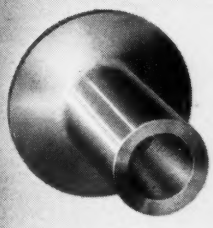

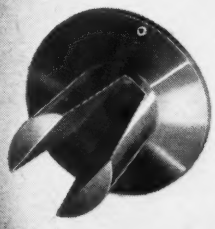

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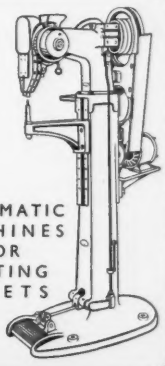

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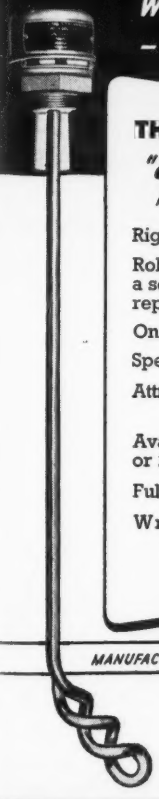

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Rigid and simple construction for long life.

Robust Temperature Control of unique design, which is a separate unit. The Micro Switch is removable for low replacement cost.

One element for 200/250 volts, reducing stock problems.

Specially designed for hard water areas.

Attractive prices.

Available in lengths from 10" to 36". Head sizes 1¼" or 2¼" B.S.P.

Full range of accessories at competitive prices.

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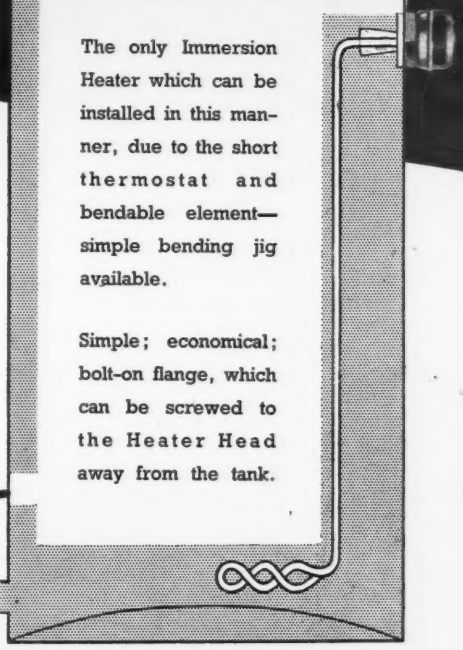
PRICES FROM
£2.5.8 Plus 16/8d. P.T.



The only Immersion Heater which can be installed in this manner, due to the short thermostat and bendable element—simple bending jig available.

Simple; economical; bolt-on flange, which can be screwed to the Heater Head away from the tank.

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Fitted with H.R.C. Fuses in each prod.

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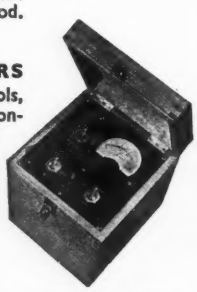

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For testing earth fault loop resistance

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Rotary switching is 'Simplified Switching'

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One [or more] of these leaflets is for YOU...

These three leaflets fully describe the wide range of standard DALY electrolytic capacitors. In general, the types listed will cover most requirements. Where specifications outside this range must be met, however, DALY will design and make special units to meet specific needs.

Behind DALY capacitors there lies 20 years of making only electrolytics, highly specialised experience which engineers throughout the world are finding invaluable, and which is readily available to you.

We shall be happy to send you copies of these leaflets without obligation.

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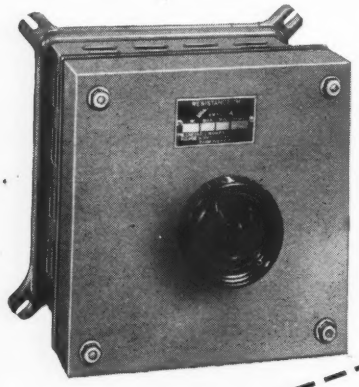

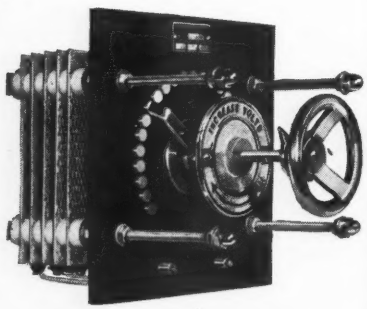

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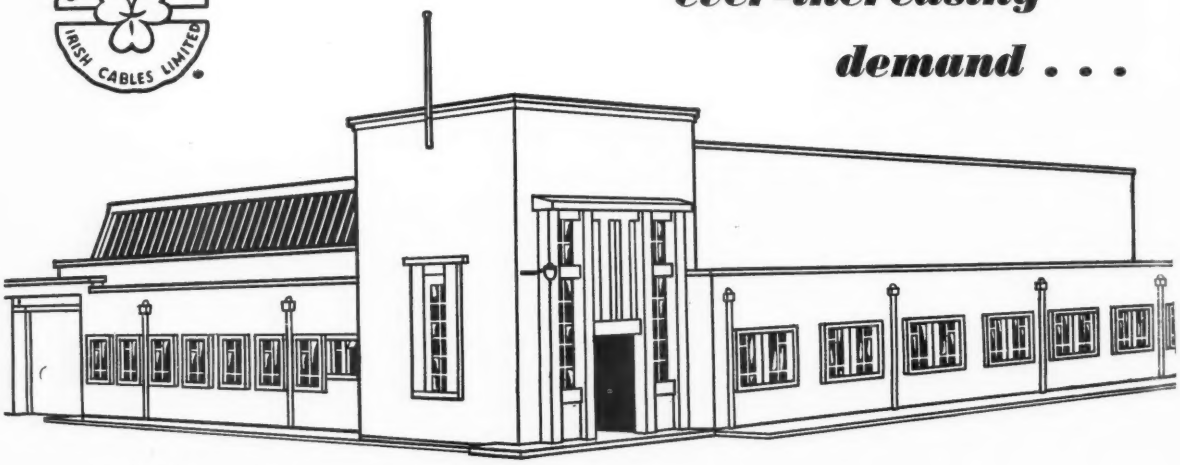

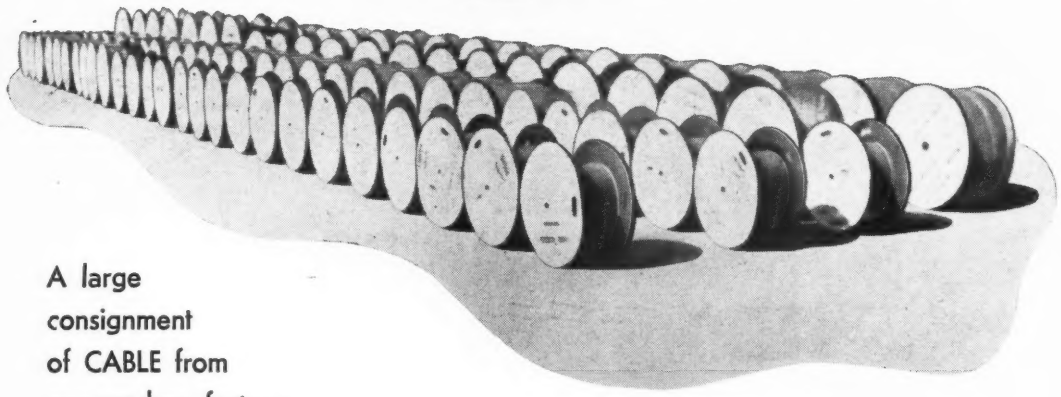

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CYCLONE FANS AND FILTERS

For dust free cooling and ventilation of motors and electrical equipment in Steel Works and other heavy industries . . . . .

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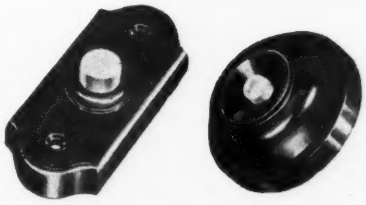

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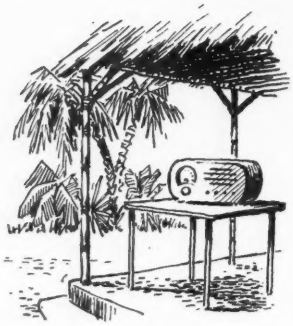

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Klingfast protects your products against humidity, moisture, and keeps out dirt, light and air.

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Klingfast holds firm, sticks evenly, is strongly self-adhesive, and has a high tensile strength.

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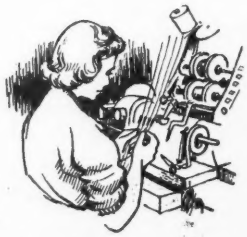

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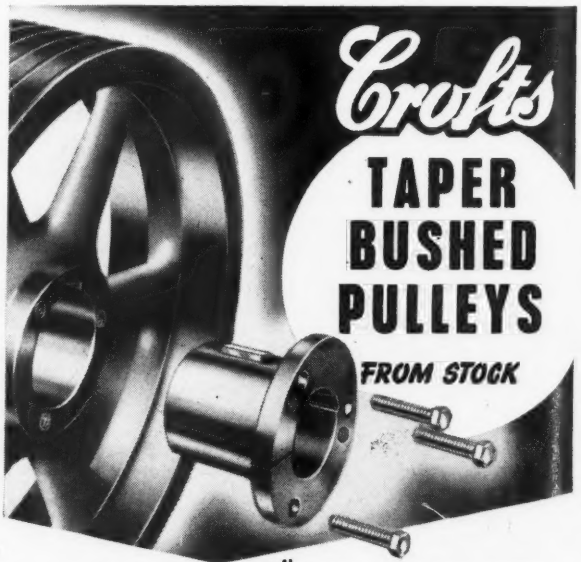

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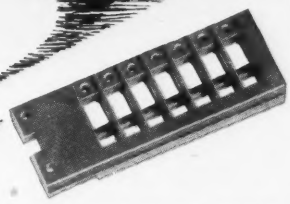
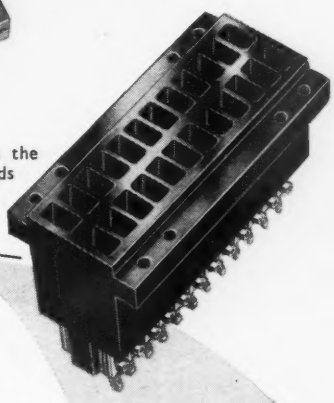
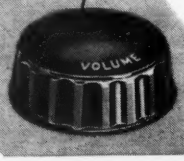
One of our mouldings in the interesting alkyd group. Our experience with this material is at your disposal.



A moulding that reflects the high engineering standards called for by the B.B.C.



An example of the high quality mouldings we have produced for Easipower Limited.



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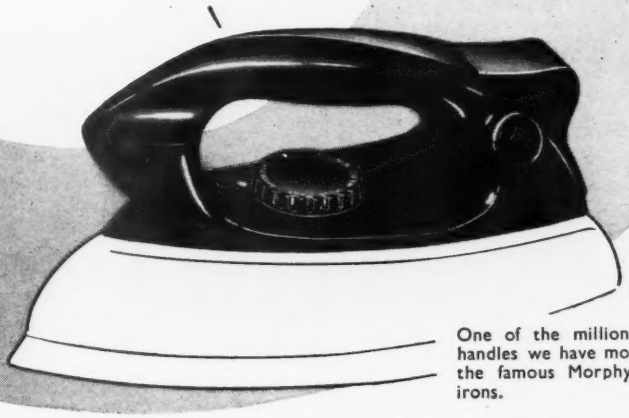

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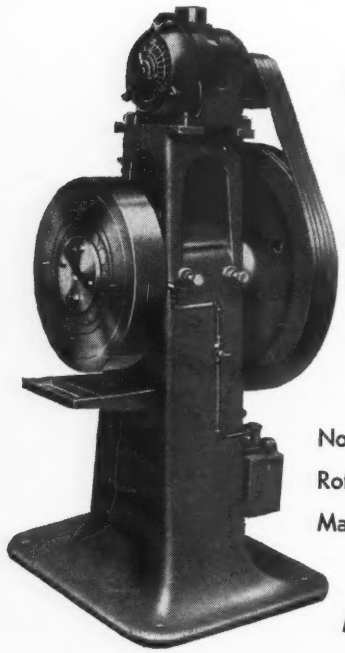

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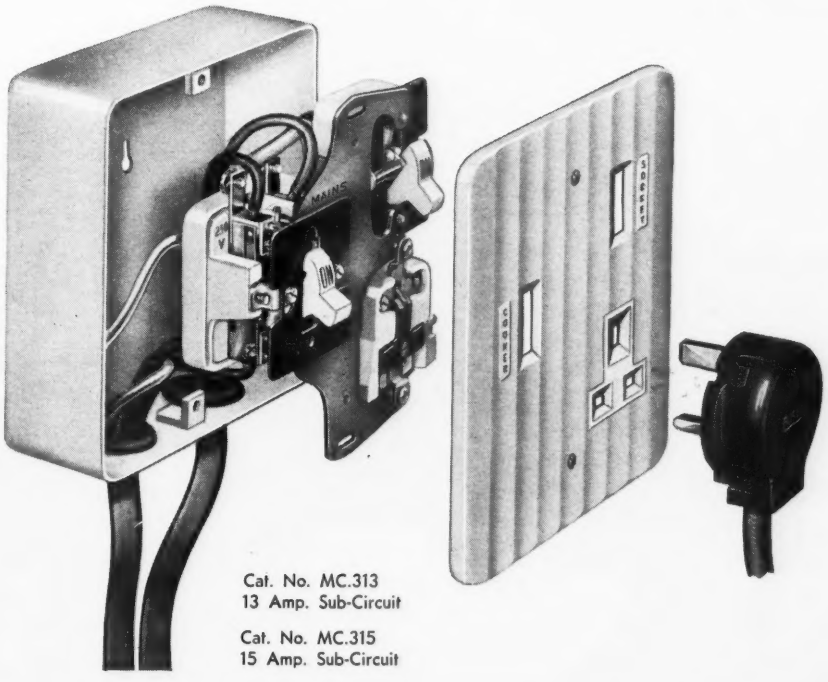
TO B.S. 1833

in 5½" x 6" x 2" Steel Boxes



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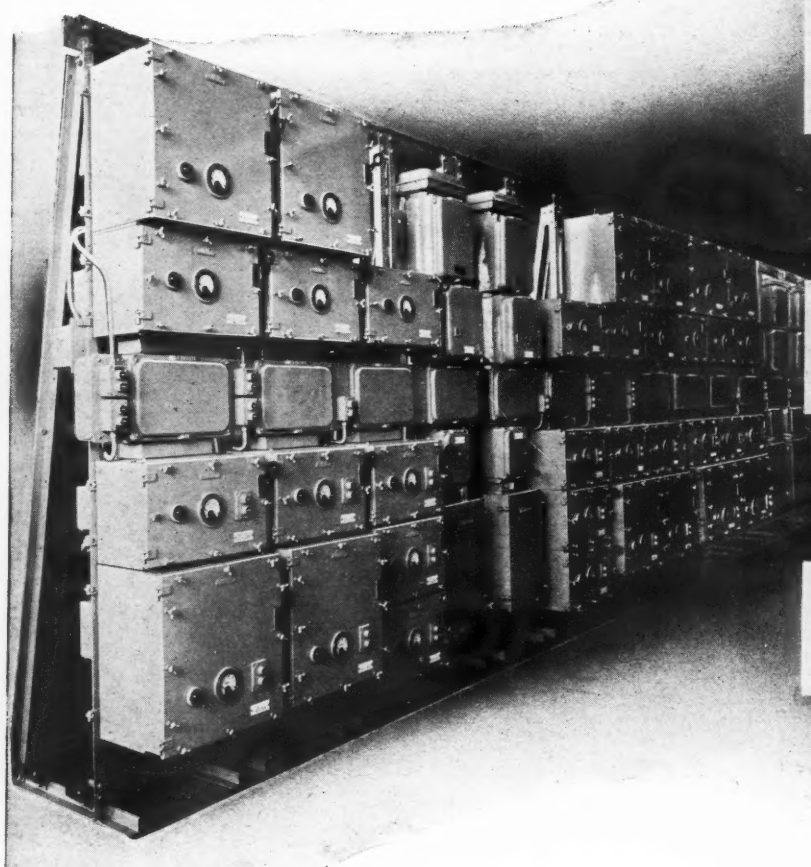
construction saves time and money



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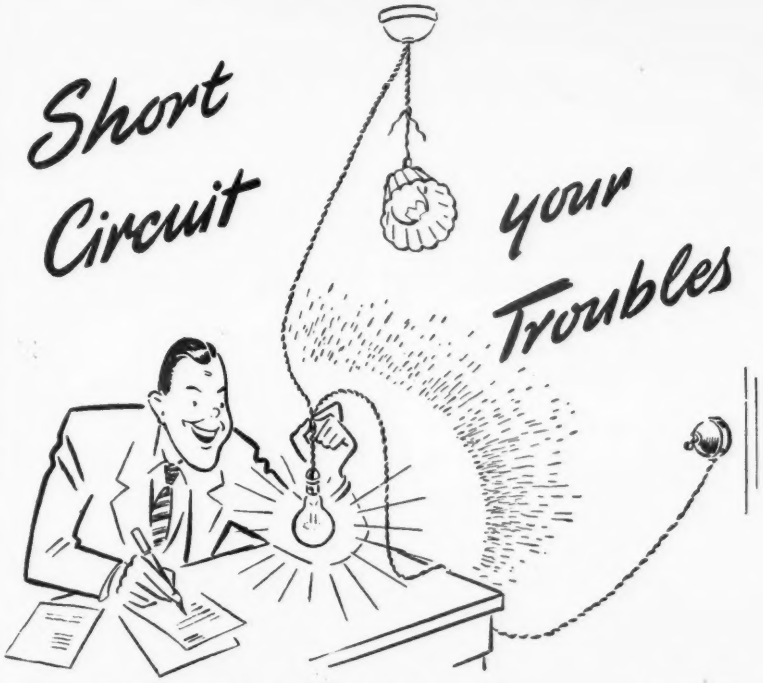

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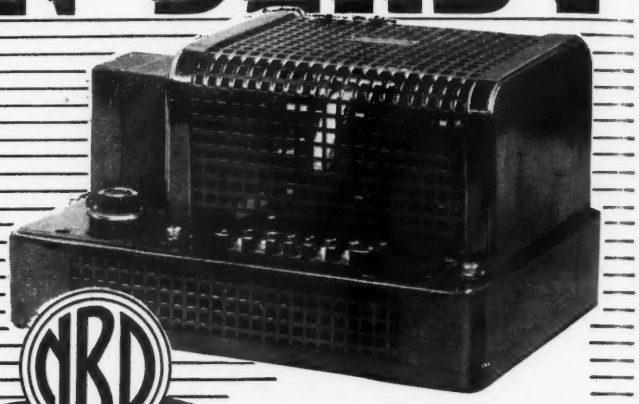

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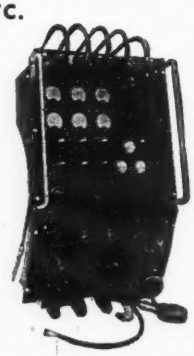

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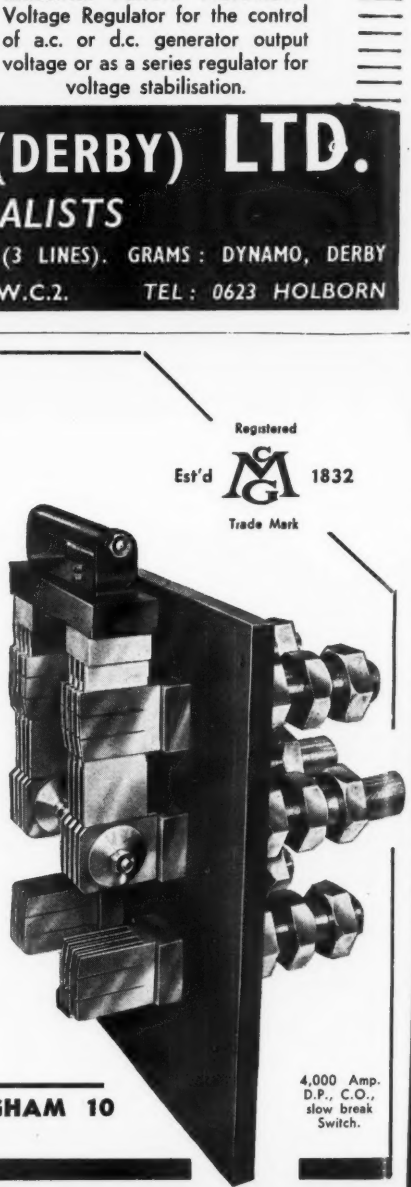

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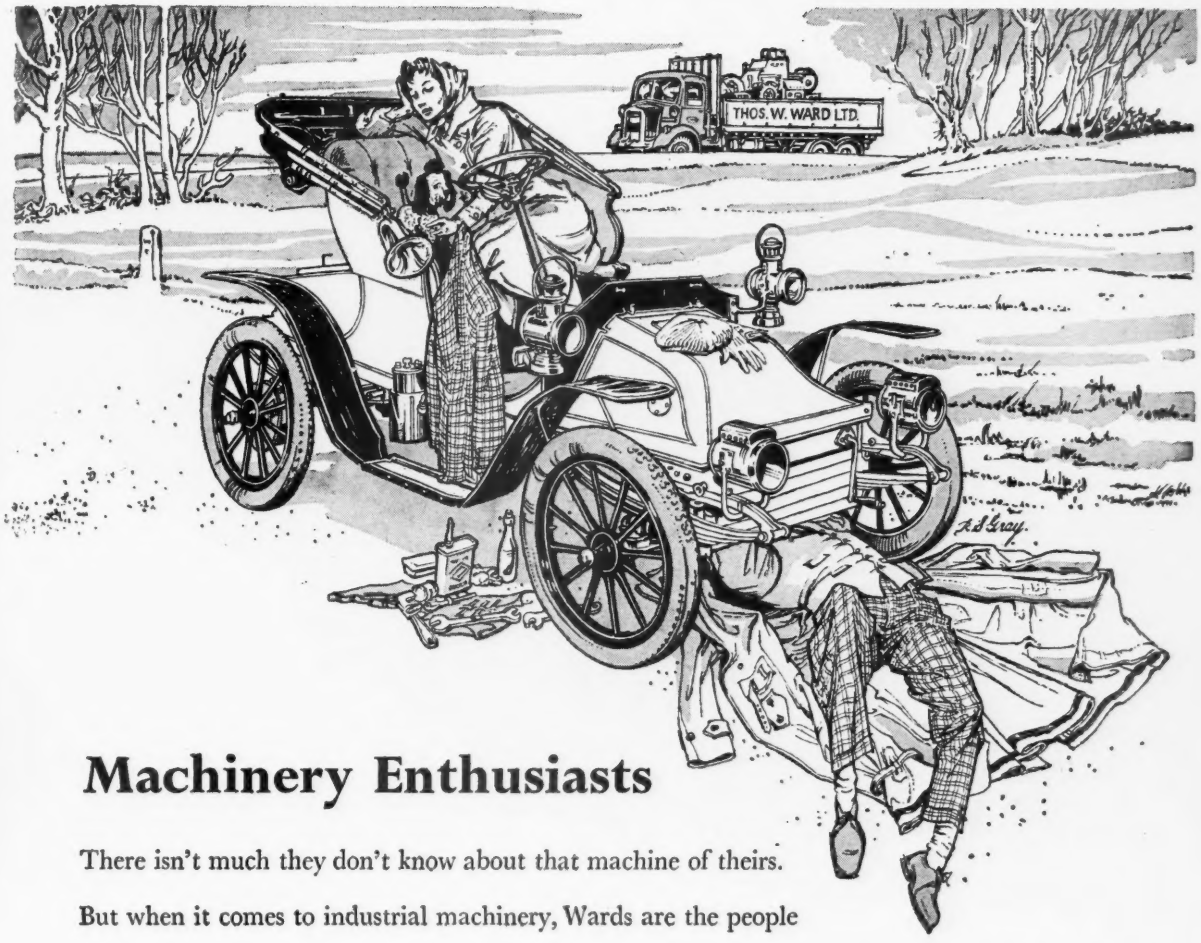

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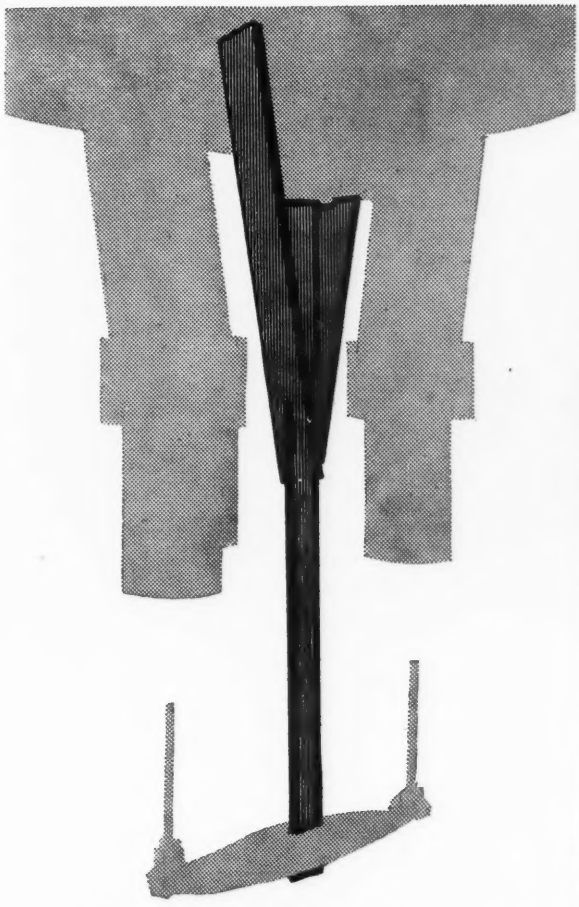

where strength is vital

IT PAYS

to insulate with

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PROVED — by years of service in many types of equipment.

RELIABLE — because manufacturing conditions are strictly controlled.

BACKED — by constant research and development — and a world-wide supply and service organization.

IMPORTANT	BS. 2572		'Permali'
'Permali' fully meets new British Standard	Class W.1	=	EH.67
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Permali is made at :—
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Subsidiaries :—
Permali (Canada) Ltd., TORONTO : Permali Inc., NEW YORK
World-Wide Agency Representation.

This is a saucepan.

I look funny in it.

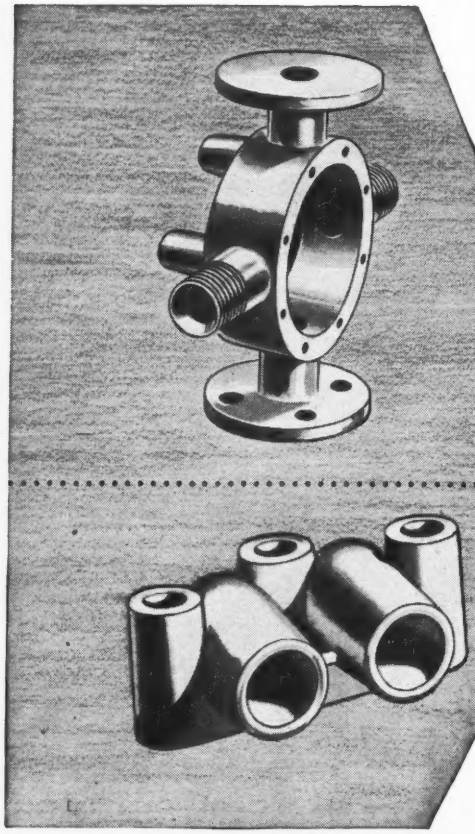
My Daddy (whom you can't see because he is taking a photograph of me) says that people who sell saucepans must be fed up with reading advertisements about saucepans.

He says that they know which are the best by their feel, their look, their price, and the way they sell.

He says that these particular saucepans have a wonderful reputation.

I can't see a reputation. Only a sort of stamp on the side like this:

HAGUE & McKENZIE LTD PYRAMID WORKS, BIRMINGHAM



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of every description for the electrical industry

We can supply pressings only or pressings machined to customers' requirements

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BUCKLE CLIPS

6 Standard Sizes in each type. 12 Standard Sizes.

PROMPT DELIVERY OF MOST SIZES

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A section of the Gravity Die Foundry
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Six Point

THERMOSTAT

- Satchwell magnetically controlled micro-gap switch
- Interchangeable with thermostats to BS 1555-1949
- Adjustable temperature setting
- Usual standard stem lengths
- Satchwell quality
- Unequalled value

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THE RHEOSTATIC COMPANY LIMITED

SLOUGH • ENGLAND
TELEPHONE: SLOUGH 23961
TELEGRAMS: THERMOSTAT · SLOUGH

B.E.P. Convention
Brighton June 27–July 1
See you on
HENLEY
Stand No 37
BRIGHTON ROCK
W. T. HENLEY'S TELEGRAPH WORKS CO. LTD., 51-53, HATTON GARDEN, LONDON, E.C.

IT'S NEW! IT'S NEWS!!

an electric
ROTARY CLOTHES DRYER and AIRER
by

Oprim REGD

Retail inc. tax
£49.16.3

The NEW fully patented Oprim Rotary Electric Clothes Dryer, works on entirely new and improved principles. The clothes are rotated by the gentle flow of warm dry air driven over BLACK HEAT safety elements. No scorching, no burning, and no fluff or nap is worn from the clothes.

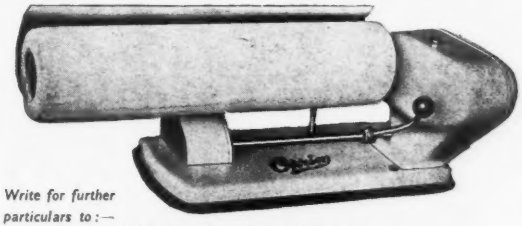
The complete load from a washing machine is rendered "ironing dry" in approximately one hour and may be aired after ironing and folding without destroying the finish.

NOTE THESE ADVANTAGES THEY SPELL S-A-L-E-S

Swift drying no matter what the weather.
Ability to air clothes after ironing and folding.
Less electricity consumed for more drying effect.
Even and gentle flow of air warmed by safety black heat element.
Superior workmanship and finish with full guarantee.

THEY GO TOGETHER — THEY SELL TOGETHER
OPRIM ROTARY IRONER SUPER 22

The new streamlined Oprim Super 22 Rotary Ironers are a proven success. Incorporating many new refinements and improvements, the result of years of experience, the Oprim Super 22 provides a new source of turnover in a field of manufacture which Oprim have pioneered. **£39.19.3** inclusive of Tax.



Write for further particulars to:—

OPRIM SALES LTD.

Div Aircraft & General Eng. Co. Ltd., Albion Works, Park Way, Edgware. EDG. 5207/8

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BEST SELLERS

on display at the B.E.P.C.

Be sure to visit our stand at the British Electric Power Convention. We will be displaying our complete range of electric kettles, coffee percolators and the famous Best Replacement Elements.

STAND No. 34

the **BEST** *stand at the B.E.P.C.*

For AC/DC, loading 1500 watts. Standard Voltages 100/120, 200/220, 230/250. Capacity 4 pts.

THE 'FANFARE' KETTLE

Its enchanting musical boiling signal has a strong appeal for women. It is elegantly designed in solid copper with a highly polished chrome finish, and its handle and three feet are heat-insulating. The thumb-flick spout-cover prevents scalding. Fitted with an automatic safety mechanism to prevent over-heating.

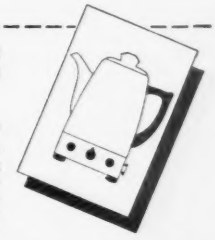
In 3 sizes: 2-pint (750w), 3 pint (1250w), 4 pint (1500w). Standard voltages 100/120; 200/220; 230/250 AC/DC.

THE NEW 'FAMILY' KETTLE

The lid of this superb kettle is cleverly designed so that it cannot fall off when pouring *and* positions the vents to deflect steam away from the hand. Fitted with heat-proof handle (which *cannot* be damaged by steam) and three heat-insulating feet. Accidental over-heating is eliminated by an automatic safety mechanism. Heavy gauge copper with plain lacquered or polished chrome finish.

ONLY THE **BEST** *KETTLES HAVE ALL THESE DISTINCTIVE FEATURES*

Send for our leaflets.

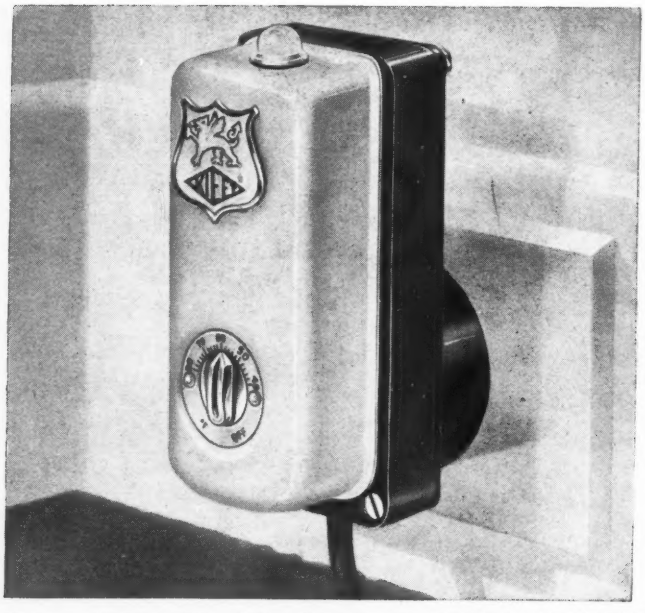


Do you stock the BEST Electric Coffee Percolator? There's a big demand for this beautiful streamlined appliance with its many labour-saving features.

BEST PRODUCTS LTD · FELIXSTOWE · SUFFOLK

Telephone: Felixstowe 1554/5. *Telegrams: Best, Felixstowe.*

There'll be a big demand for this autumn!



The KIEFT Plug-in Thermostat has proved an outstanding sales success everywhere, thanks to its wonderful convenience and economy. Easily fitted, exactly as a plug, to any type of electric heater or radiator, it is ideal for the home, office, greenhouse, garage, etc. No wiring, no fuss. Stock up NOW and profit by the tremendous demand for this proved sales winner.

RETAIL PRICES

Wall mounted models from **41/3d.**
Plug-in type from **56/6d.**

Make sure of your supplies for the autumn season by **ordering NOW!**

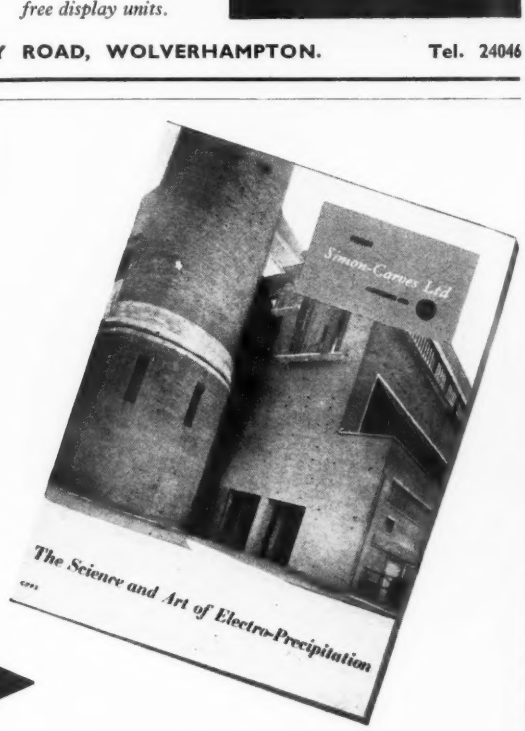
★

Write TO-DAY for illustrated folder and details of attractive free display units.

KIEFT
PLUG-IN THERMOSTAT

CYRIL KIEFT & CO. LTD. (Thermostat Division), 13 DUDLEY ROAD, WOLVERHAMPTON. Tel. 24046

For dust removal and mineral recovery processes—



For a quarter of a century Simon-Carves have pioneered improvements and innovations in the design and construction of electro-precipitators and can today apply that experience to new fields in which electro-precipitation is proving the solution to an increasing variety of dust problems.

Send for "The Science and Art of Electro-Precipitation" (please quote B/C.P.P.3)

High efficiency electro-precipitation by Simon-Carves Ltd

SIMON ENGINEERING GROUP

STOCKPORT, ENGLAND

OVERSEAS COMPANIES | *Simon-Carves (Africa) (Pty) Ltd: Johannesburg* *Simon-Carves (Australia) Pty Ltd: Botany, N.S.W.*

S. C. 105

It's new—it's 33 gns

There is not another cooker to compare with the new Tricity Coronet. Low priced, with time-switch control identical to that used in the famous Tricity Queen and—revolutionary idea—a set of space saving 'Phoenix' ovenware that enables the oven to hold *MORE than many big cookers*. It has been tested, proved and acclaimed beyond doubt.
Look at the price again and consider the big market the Coronet opens up to time controlled cookers. Think of its unique appeal which no housewife can resist. The demand is big already and will continue to grow. Order now and be sure of quick and steady sales.

* TIME SWITCH CONTROL

* UNIQUE SPACE-SAVING OVENWARE

The special ovenware supplied with the Tricity Coronet (and only the Coronet) comprises
2 'Phoenix' Glass Casseroles
1 'Phoenix' Glass Baking Dish
3 Swiss Roll Tins
2 one doz. Patty Tins
2 Sandwich Tins and
One heat resisting oven glove.

TRICITY CORONET

Thorn TRICITY COOKERS LIMITED, 109 KINGSWAY, LONDON, W.C.2 • TELEPHONE HOLBORN 2161-2162

TYERS JOINTERS MELTING EQUIPMENT

OIL PRESSURE CONTAINERS COMPLY WITH B.S. SPECIFICATIONS 1099 AND 487.

MADE IN **SIX SIZES**, FROM 2 TO 12 PINT CAPACITY. *Enquiries to:*

The LAST WORD IN PROTECTION!

Latest Improved Hinged Lid BUCKET. (Regd. Design No. 872165). *Ask for details*

EST. 1885

PORTABLE FURNACE & PATENTS CO.

TYERS JOINTERS FURNACE CARRINGTON NOTTINGHAM ENG. *'Phone* 64887

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SUITABLE FOR BAKELITE OR BRASS BAYONET FITTINGS

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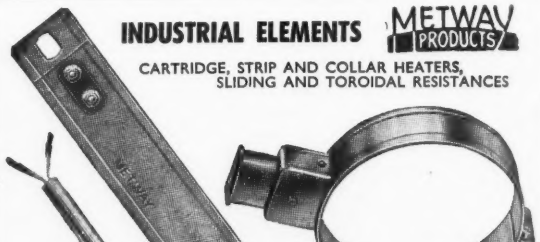
CARTRIDGE, STRIP AND COLLAR HEATERS, SLIDING AND TOROIDAL RESISTANCES



For full details, ask for **Cat. No. JYL/30ER**

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Repetition Work • Nuts and Screws

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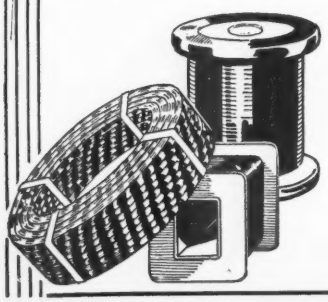
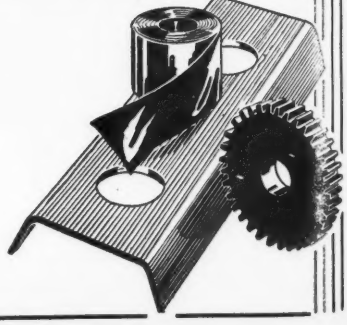


ENAMELLED, SILK and COTTON covered Copper Wires, Single or Stranded, also Tinned, Paper, Asbestos and Plastic Westoflex covered. RESISTANCE WIRES. LITZ WIRES.

MICA, MICANITE and BAKELITE in all forms. Heat Resisting Boards. Canvasite for Silent Gears. Oil Cloth, Silk and Paper Slot Insulations. Insulation Varnishes. Varnished Fabric and Plastic Sleeving. Moulded and Machined Pieces, etc.



WEST INSULATING COMPANY LTD.

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Telephones: Abbey 2814 & 7352

New & Secondhand PLANT & MACHINERY for prompt delivery from the LARGEST STOCKS in the country

page 600

STEAM DRIVEN GENERATING SETS

3,750 kVA (2,750/3,000 kW) FRASER & CHALMERS/G.E.C. Condensing Turbo Alternator Set. Steam pressure 175/190 lb. sq. in., 627° F. Alternator 3,300/3/50.

625 kW Turbo Generator Set by Met-Vick. Steam pressure 170 lb. sq. in., 120° F. superheat. Steam consumption 15·64 lb. kW hr. Driving through Reduction Gear. Generator 240 volts D.C. 1,000 r.p.m.

650 kVA (500 kW) Steam driven Alternator Set by BELLISS & MORCOM/SIEMENS, for 5,000/3,300 or 400/440/3/50. Steam pressure 150/155 lb. sq. in. Speed 333 r.p.m.

625 kVA (500 kW) Turbo Alternator Set by DANIEL ADAMSON/BRUCE PEEBLES. Driving through Reduction Gear Alternator 400/440/3/50. Steam pressure 90/150 lb. sq. in., 100° F. superheat, exhausting to Surface Condenser.

250 kW Geared Turbo Generator Set by BELLISS & MORCOM/CROMPTON PARKINSON, for 207/230 volts D.C. Speed 1,000 r.p.m. through reduction gear. Multi stage Turbine designed for steam at 290 lb., 550° F. superheat plus 25% overload for two hours when running at 6,000 r.p.m.

187·5 kVA (150 kW) Steam driven Alternator Set by BROWETT LINDLEY/BRUCE PEEBLES. Steam pressure 160 lb. against 10 lb. back pressure. Alternator 400/3/50. Speed 428 r.p.m.

125 kVA (100 kW) Steam driven Alternator Set by ASHWORTH PARKER/CROMPTON PARKINSON for 400/440/3/50. Steam pressure 100/150 lb. sq. in., 10/40 lb. back pressure.

ALTERNATORS

2,340 kVA G.E.C., 3,000/3,300/3/50, 4 wire, 3,000 r.p.m., 0·8 p.f., 410 amps. With direct coupled Exciter.

Two 1,040 kVA E.E.C. 400/3/50, 1,500 amps. 0·8 p.f. 428 r.p.m. Cont. rated. Each with direct coupled Exciter.

625 kVA Revolving field ALTERNATOR by E.E.C. for 440/3/50, 4 wire supply, with direct coupled Exciter. 17·5 kW. 50 volts. Speed 600 r.p.m.

500 kVA Crompton Parkinson 500/550/3/50, 1,000 r.p.m. Open type with direct coupled Exciter.

350 kVA (280 kW) E.C.C. 415/440/3/50, 4 wire supply, 487 amps, speed 375 r.p.m. Open type with direct coupled Exciter.

275 kVA Crompton Parkinson, 400/3/50, 4 wire, speed 1,000 r.p.m. 0·8 p.f. Vee belt driven Exciter.

125 kVA B.T.H. 400/3/50, 0·8 p.f., speed 600 r.p.m. Enclosed type with direct coupled Exciter.

70 kVA Westinghouse, 400/3/50, 4 wire, speed 600 r.p.m., 0·8 p.f. Overhung Exciter.

50 kVA Alpha Harris 440/3/50, 4 wire, speed 1,500 r.p.m. Belt driven Exciter.

45 kVA Westinghouse, 400/3/50, 4 wire, speed 1,000 r.p.m. With integral Exciter.

OIL IMMERSED CIRCUIT BREAKERS
400/440/3/50

Amps.	*Make*	*Type*
2,000	G.E.C.	Drawout
1,600	Statter	Drawout
1,500	Ellison	Drawout
1,000	Airedale	Floor mounting
800	E.E.C.	Floor mounting
800	Airedale	Floor mounting
500	Statter	Floor mounting
500	Ellison	Floor mounting
400	Statter	Floor mounting
300	Ellison	Wall mounting
300	Ellison	Floor mounting
300	Ellison	Drawout

MULTITUBULAR BOILERS

Three Size No. 22 Cochran, 17 ft. × 8 ft. 6 in. dia. Evap. 4,960/6,600 lb., one 150 lb. sq. in. W.P., two at 130 lb. sq. in.

Size No. 35 Ruston Thermax vert. Boiler, 15 ft. × 6 ft. dia. W.P. 120 lb. sq. in. Evap. 2,550/3,380 lb. at 60° F. or 3,050/4,050 lb. at 212° F.

Size No. 30 Ruston Thermax, 14 ft. × 7 ft. dia. Evap. 2,110/2,530 lb. at 120 lb. sq. in. W.P.

Size No. 16 Cochran vert. Boiler, 14 ft. × 6 ft. 6 in. dia. W.P. 100 lb. sq. in. Evap. 2,360 lb. normal or 3,100 heavy steaming.

Size No. 16 Cochran, 14 ft. plus 2 ft. 6 in. extended skirt × 6 ft. 6 in. dia. Evap. 2,360/3,100 lb. at 150 lb. W.P.

Size No. 14 Cochran, 14 ft. × 6 ft. dia. Evap. 2,000/2,600 lb. at 150 lb. sq. in. W.P.

Size No. 8 Cochran, 13 ft. 8 in. × 5 ft. dia. Evap. 1,390 lb. at 100 lb. sq. in. W.P.

Size No. 13 Cochran, 13 ft 6 in. × 6 ft. dia. Evap. 1,880/2,500 lb. at 150 lb. sq. in. W.P.

Size No. 25 Ruston Thermax 13 ft. × 5 ft. 1 in. dia. Evap. 1,730/2,080 lb. at 120 lb. sq. in. W.P.

Size No. 12 Cochran, 12 ft. 6 in. × 6 ft. dia. Evap. 1,880/2,500 lb. at 160 lb. sq. in. W.P.

Size No. 8 Cochran, 11 ft. 3 in. × 5 ft. dia. Evap. 1,150/1,520 lb. at 105 lb. sq. in. W.P.

Size No. 7 Cochran vert. Boiler, 10 ft. 3 in. × 4 ft. 9 in. dia. W.P. 100 lb. sq. in. Evap. 1,030 lb. at 50° F.

Size No. 3 Cochran vert. Boiler, 8 ft. 6 in. × 3 ft. 9 in. dia. W.P. 100 lb. sq. in. Evap. 540 lb. normal or 700 lb. heavy steaming.

3-PHASE TRANSFORMERS

kVA	*Make*	*Primary*	*Secondary*	*Type*
750	Bryce	11,000	430	Indoor
500	E.C.C.	6,600	415	Outdoor
500	Brush	3,300	440	Indoor
400	Hackbridge	3,300	400	Indoor
300	E.C.C.	6,600	415	Indoor
200	B.E.T.	15,000	400	Outdoor
200	Hackbridge	30,000	400	Outdoor
125	Hackbridge	6,600	400	Indoor
110	G.E.C.	11,000	400	Indoor
100	B.E.T.	22,000	220	Outdoor
100	Met.-Vick.	5,500	400	Outdoor

GEORGE THE 600 GROUP OF COMPANIES **COHEN**

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ER/556/PG474

You are cordially invited to inspect our range of products on Stand No. 20 at the BRITISH ELECTRICAL POWER CONVENTION, BRIGHTON

SALFORD ELECTRICAL INSTRUMENTS LTD
PEEL WORKS • SILK STREET • SALFORD 3 • LANCS
A Subsidiary of THE GENERAL ELECTRIC CO. LTD. OF ENGLAND

Specialists in NON-FERROUS CASTINGS FOR THE ELECTRICAL INDUSTRY

Sandwell Castings are incorporated in many of the best known products throughout the Electrical Industry. (Illustrated is a typical Sandwell Casting used in Reyrolle 132 kV 3,500 MVA air-blast circuit-breakers.) When next you require precision non-ferrous Sand Castings, Gravity Die Castings or Pressure Die Castings, LET SANDWELL QUOTE. You will find our prices keenly competitive and deliveries prompt.

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RESISTANCE WIRES

TOPHET

STAINLESS STEEL WIRES

The 'Tophet' range of resistance materials is eminently suitable for use under the most exacting conditions as the physical and mechanical properties always remain constant, ensuring long and efficient service.
Our RESISTANCE HANDBOOK gives complete electrical and physical data regarding 'Tophet' resistance wires, stainless steels and ultra fine wire, as well as particulars of our 'Truflex' thermostatic bimetal.

Manufactured by GILBY-BRUNTON LIMITED
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Telephone: Musselburgh 2369
LONDON OFFICE: 47 WHITEHALL, S.W.1. *Tel: WHitehall 6058*

Aeroflex Ceram HOPE'S PATENTS

FUSES and CONTACTS

These rewireable, multiple element cartridge fuse links afford a fusing factor of 1.25 and a breaking capacity of 25 M.V.A. They are interchangeable with other makes and they are embodied in the two types of Aeroflex Fuse units shown - the Link Type and the Radok Type. The latter has fully shrouded contacts in compliance with the Factory Acts.

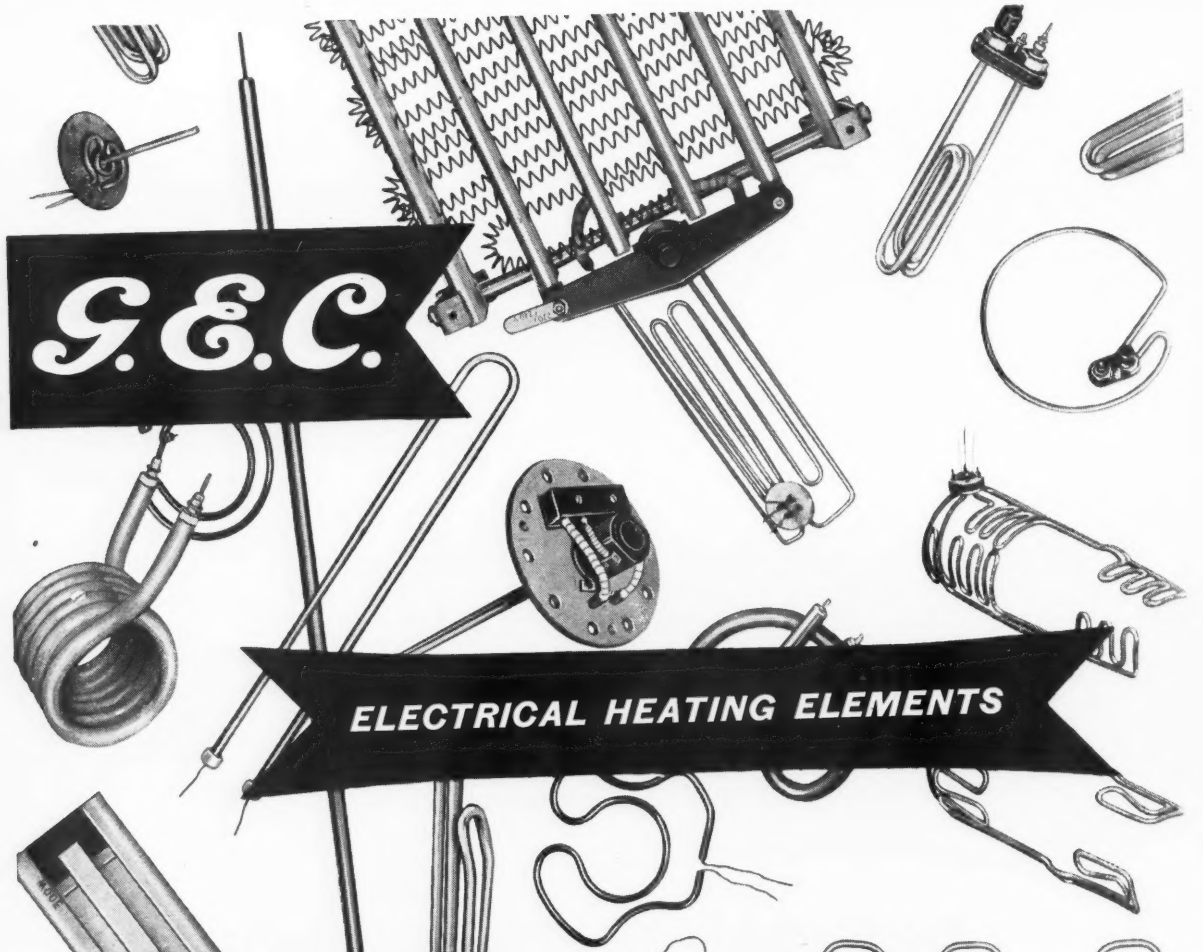
The Aeroflex Ceram range is fully described in our publications Nos. CF1., RU1., LU1 and TC1.

Aeroflex HOPE'S PATENTS

PARMITER HOPE & SUGDEN LIMITED, MANCHESTER 12

LONDON: 34 VICTORIA STREET, S.W.1. GLASGOW: 5 SOMERSET PLACE, C.3
BIRMINGHAM · 39/41 CARRS LANE, 4.

dm PH 93



If your particular product needs electrical heating elements—the G.E.C. can make them for you.

The G.E.C. brings a wealth of valuable experience to the solution of your particular problems. Whatever your product, whatever industry you represent, the G.E.C. can make exactly the right elements for your requirements.

Write to the G.E.C. Industrial Heating Department for further information.

G.E.C. ELECTRIC HEATING ELEMENTS FOR INDUSTRY

THE GENERAL ELECTRIC CO. LTD., MAGNET HOUSE, KINGSWAY, LONDON W.C.2

CLASSIFIED ADVERTISEMENTS

ADVERTISEMENTS are accepted up to First Post on Monday of the week of issue and should be addressed to ELECTRICAL REVIEW, Classified Advertisement Department, Dorset House, Stamford Street, London, S.E.1.

Original testimonials should not be sent with applications for employment.

CLASSIFIED advertisements are PREPAID at 3/- per line (approx. 6 words) per insertion. Where an advertisement includes a Box Number this counts as two words and carries an additional charge of 1/-.

DISPLAYED:—£2 per inch, per insertion. Cheques and Postal Orders should be crossed and made payable to ELECTRICAL REVIEW PUBLICATIONS LTD.

SITUATIONS WANTED:—Three insertions under this heading can be obtained for the price of two if ordered and prepaid with the first insertion.

REPLIES to Box Numbers should be addressed to the Box Number in the advertisement, c/o ELECTRICAL REVIEW, Dorset House, Stamford Street, London, S.E.1, but if not to be delivered to any particular firm or individual they should be accompanied by instructions to this effect, addressed to the Manager of the ELECTRICAL REVIEW. Replies in such cases cannot be returned. The name of an advertiser using a Box Number will not be disclosed.

OFFICIAL NOTICES, TENDERS, ETC.

STOCKSBRIDGE URBAN DISTRICT COUNCIL

Stockport-Sheffield-Lincoln Trunk Road A.616

Installation of Lighting by Sodium Vapour Discharge Lamps

TENDERS are invited for the following works: The supply, erection and putting into service of a system of one hundred 140-w. Lighting Units mounted on concrete columns in Manchester Road, Stocksbridge, Sheffield.

Tenders may be submitted as follows:—

(a) Supply of electrical equipment.
(b) Supply and erection of concrete columns and brackets, together with the fitting and wiring of electrical equipment offered under (a).
(c) Supply and erection of concrete columns and brackets, together with the fitting and wiring of electrical equipment offered by another firm.

Firms may tender for (a) or (c) only or any suitable combination of sections.

Specifications, bills of quantities and form of tender may be obtained from Douglas E. Robinson, Surveyor, Town Hall, Stocksbridge, Sheffield, and plans of the scheme may be inspected at his office during normal office hours.

Tenders, in a plain sealed envelope endorsed "Trunk Road Lighting," should be delivered to me not later than noon on Monday, the 18th July, 1955.

JOHN HODGKINSON,
Town Hall, Clerk of the Council,
Stocksbridge, Sheffield.
18th June, 1955. 2855

COUNTY OF CORNWALL

Junior and Infants' School, St. Eval

APPLICATIONS are invited from Electrical Contractors for permission to tender for the ELECTRICAL SERVICES Sub-Contract in connection with the erection of a NEW JUNIOR AND INFANTS' SCHOOL for 280 pupils at St. Eval.

Applications are invited for permission to tender and should be made to Mr. Sydney Gregson, F.R.I.B.A., County Architect, County Hall, Truro, not later than Thursday, 7th July, 1955, from which a selected number of firms will be invited to tender.

The closing date for receipt of tenders will be notified when the documents are despatched.

The lowest or any tender will not necessarily be accepted, nor will the County Council pay to contractors any fees or expenses incurred in the preparation of tenders.

E. T. VERGER,
County Hall, Clerk of the County Council.
Truro.
17th June, 1955. 2854

STEPNEY M.B.C.

Lance Street Housing Scheme

TENDERS are invited for:—

(a) Installation of Electric Lighting and Power Points for 30 dwellings.
(b) Providing and installing complete one Electric Passenger Lift.

Forms of tender, with conditions, etc., obtainable from the Borough Engineer and Surveyor, Municipal Offices, 227/233, Commercial Road, London, E.1. In the case of tender (a) only the payment of a deposit of £5 5s. will be required.

Closing date for tenders, Monday, 11th July, 1955.

WILFRED REEVE,
Town Clerk. 2787

CITY OF BIRMINGHAM

To Electrical Contractors

THE Welfare Committee invite tenders for the installation of Electric Lighting and Power at the Aged Persons' Home, Alvechurch Road, West Heath, Birmingham, 31.

General conditions (which include the Corporation's usual Fair Wages and Conditions of Labour Clause) may be inspected at the Mechanical and Public Lighting Department, 38, Cambridge Street, Birmingham, 1. Copies of the special conditions, specification and plans, etc., can be obtained on payment of £2 2s. at the office of Sir Herbert J. Manzoni, City Engineer and Surveyor, Civic Centre, Birmingham, 1, to whom all cheques should be made payable. The deposit will be returned on receipt of a bona fide tender.

Tenders, enclosed in the envelope provided for the purpose, must be sealed and delivered to the Town Clerk's Office (Room No. 12A), Council House, Birmingham, 1, not later than 12 noon on Wednesday, 6th July, 1955, when they will be opened. Tenders received after that time will be rejected.

The Committee do not bind themselves to accept the lowest or any tender.

J. F. GREGG,
Council House, Town Clerk.
Birmingham, 1. 2805

BOROUGH OF LLANELLY

New Street Lighting

TENDERS are invited for the installation of of approximately 300 Class A Lighting Units consisting of 140-watt Sodium Discharge Lamps, Switchgear, etc., on new columns in the main traffic routes and town centre in the Borough of Llanelly.

General conditions of contract and agreement, together with the plan showing the layout of the new lamps, can be inspected, and specification and forms of tender obtained from the office of the Borough Engineer, Town Hall, Llanelly, on payment of a deposit of £2 2s., which will be refunded upon receipt of a bona fide tender not subsequently withdrawn and the return of all documents.

Tenders in plain sealed envelopes bearing no indication of the sender, but endorsed "Street Lighting Tender," must be returned to the undersigned by Friday, the 8th July, 1955.

The Corporation do not bind themselves to accept the lowest or any tender.

S. SAMUEL,
Town Hall, Llanelly. Town Clerk.
13th June, 1955. 2806

SLEAFORD URBAN DISTRICT COUNCIL

Street Lighting, District Roads, Class B

TENDERS are invited for the supply and installation of 89 80-watt Mercury Discharge Lighting Units with all the necessary control gear and wiring and the provision and erection of 78 Concrete Lighting Columns and 11 C.I. Brackets.

Drawings, forms of agreement and conditions of contract may be inspected at the Council Offices and specification, bills of quantities and forms of tender may be obtained from the undersigned on payment of a deposit of £1 1s., which will be returned on receipt of a bona fide tender.

Tenders and completed bills, enclosed in sealed envelopes endorsed "Street Lighting, District Roads," should be delivered to the undersigned not later than noon on Saturday, 30th July, 1955.

ERIC W. LOVATT,
Westgate House, Clerk of the Council.
25, Westgate,
Sleaford, Lincs. 2853

NORTH OF SCOTLAND HYDRO-ELECTRIC BOARD

Electric Lighting and Heating Installation and other Wiring at Kilmelfort Power Station and Loch Tralaig Dam, Argyllshire

TENDERS are invited for the above-mentioned installation and other wiring services. Copies of the tender document may be obtained on application with a cheque for £2 2s. (returnable) to the Engineers, Messrs. Strain & Robertson, 5, Park Circus, Glasgow, C.3. The Board do not bind themselves to accept the lowest or any tender.

H. W. SIMPSON,
16, Rothesay Terrace, Secretary.
Edinburgh. 2851

NORTH OF SCOTLAND HYDRO-ELECTRIC BOARD

Inverness-Elgin Reinforcement

TENDERS are invited for the supply and construction of a 132-kV double circuit steel tower transmission line between Nairn and Keith. Copies of the tender document may be obtained on application to the Engineers, Messrs. Merz & McLellan, 72a, George St., Edinburgh, 2.

Applications should be accompanied by a cheque for £2 2s. (returnable). The Board do not bind themselves to accept the lowest or any tender.

H. W. SIMPSON,
16, Rothesay Terrace, Secretary.
Edinburgh. 2824

CITY OF MANCHESTER

Supply of Electric Lamps

THE City Council invite tenders for the supply of Electric Lamps. Forms of tender obtainable from the City Surveyor, Town Hall, Manchester, 2.

Tenders enclosed in the official envelope and addressed to the Chairman of the Central Purchasing Committee must be delivered before 10 a.m. on the 7th July, 1955.

The Corporation does not bind itself to accept the lowest or any tender.

PHILIP B. DINGLE,
Town Hall, Town Clerk.
Manchester, 2.
23rd June, 1955. 2884

CITY OF MANCHESTER

THE Education Committee invite tenders for Electrical Installation required at Kirkmanshulme Grammar School, Manchester. Specification, drawings and tender form may be obtained from the City Architect, P.O. Box 488, Town Hall.

Tenders, sealed in endorsed envelopes, must be delivered before 10 a.m. on 25th July, 1955.

PHILIP B. DINGLE,
17th June, 1955. Town Clerk.
2852

COUNTY BOROUGH OF WIGAN

Electrical Installations: Market Hall Extension, Market Street, Wigan

TENDERS are invited from experienced Electrical Contractors for the complete Electrical Installations of 8 shops, 2 kiosks and adjacent arcades in the new Market Hall Extension, Market Street, Wigan.

The plan of the shops, kiosks and arcades, together with the specification and schedule of the electrical installation, may be obtained from the Borough Engineer, Municipal Buildings, Hewlett Street, Wigan, on payment of £1 1s. deposit, which will be returned upon receipt of a bona fide tender and the return of the plans.

Tenders must be endorsed and sealed in the official envelope provided, bearing no mark or name indicating the sender, and must be received by the undersigned not later than 12 noon on Friday, 15th July, 1955.

The Council do not bind themselves to accept any or the lowest tenders.

ALLAN ROYLE,
Municipal Buildings, Town Clerk.
Wigan. 2804

SITUATIONS VACANT

The engagement of persons answering these advertisements must be made through the Local office of the Ministry of Labour and National Service, etc., if the applicant is a man aged 18-64 or a woman aged 18-59 inclusive, unless he or she or the employer is excepted from the provisions of The Notification of Vacancies Order, 1952.

SENIOR SCIENTIFIC OFFICERS AND SCIENTIFIC OFFICERS

THE CIVIL SERVICE COMMISSIONERS invite applications for pensionable appointments. Applications may be accepted up to 31st December, 1955, but early application is advised as an earlier closing date may be announced. Interview boards will sit at frequent intervals.

The Scientific posts cover a wide range of scientific research and development in most of the major fields of fundamental and applied science. In Biological subjects the number of vacancies is small; individual vacancies exist for candidates who have special knowledge of or who are interested in palæobotany, foraminifera, and recent and pleistocene mammals.

Candidates must have obtained a university degree with first or second class honours in an appropriate scientific subject (including engineering) or in mathematics, or an equivalent qualification; or possess high professional attainments. Candidates for Senior Scientific Officer posts must in addition have had at least three years' postgraduate or other approved experience.

Candidates taking their degrees in 1955 may apply before the result of their degree examination is known.

Age limits: Senior Scientific Officers, between 26 and 31, but specially suitable candidates under 26 may be admitted. For Scientific Officers between 21 and 28 during 1955 (up to 31 for permanent members of the Experimental Officer class).

Salary (London): Senior Scientific Officers (men) £1,010-£1,185, (women) £893-£1,077; Scientific Officers (men) £492-£885, (women) £492-£795. Women's scales subject to improvement under equal pay scheme. Somewhat lower rates in the Provinces.

Further particulars from Civil Service Commission, Scientific Branch, 30, Old Burlington Street, London, W.1, quoting No. S.53/55 for Senior Scientific Officers and S.52/55 for Scientific Officers. 2838

CABLE INSTALLATION STAFF FOR SINGAPORE

(a) ASSISTANT CONTRACT ENGINEER to supervise cable installation contracts.

(b) FOREMAN/JOINTER for cabling up to and including 22kV cables.

The above staff are required for work in Singapore and Malaya. Engagement on a 3 year agreement. Salary according to qualifications and experience. Bachelor quarters provided free.

Applicants should be unmarried and please apply giving full details to—Box 2616.

LONDON ELECTRICITY BOARD

Vacancies: Engineering Draughtsmen

APPLICATIONS are invited for various vacancies within the Board. These posts are permanent and superannuable and are graded under Schedule D of the National Joint Board Agreement as Grade 6, £535 10s. to £661 10s. per annum, inclusive of London allowance.

Vacancy No. V/1973/R. SOUTH EASTERN SUB-AREA, Design & Planning Branch at Woolwich, S.E.18. Applicants should have had a good general and technical education in building construction and architecture, and experience in the design of small buildings in brickwork and reinforced concrete and the drawing up of specifications.

Vacancy No. V/1972/R. HAMPSTEAD/WILLESDEN DISTRICT (Design & Planning). Applicants should have had a good general and technical education in electrical engineering and building construction, and experience in mains records office dealing with systems of all voltages up to 11 kV.

Vacancy No. V/1971/R. NORTH EASTERN SUB-AREA (at Stratford, E.15). Candidates should have had a good general and technical education and be experienced in one or more of the following subjects: engineering drawings; plant lay-out in substations; layouts and site plans of mains work; electrical diagrams.

Vacancy No. V/1967/R. ST. MARYLEBONE/ST. PANCRAS DISTRICT (Design & Planning). Applicants should have had a good general and technical education in electrical engineering and building construction, and experience in mains records office dealing with systems of all voltages up to 11 kV.

Vacancy No. V/1965/R. NORTHERN SUB-AREA, Design & Planning Branch (at Aldersgate St., E.C.1). Applicants should preferably have had experience in mains recording with a public utility authority, preferably with an electricity board, and be able to obtain particulars on site and compile accurate permanent records. Some knowledge of electrical plant layout, building construction and simple reinforced concrete structures would be an additional advantage.

Vacancy No. V/1947/R. WESTERN SUB-AREA (at Eccleston Place, S.W.1). Candidates must have had a good general and technical education up to National Certificate standard, and must be neat draughtsmen. They should be conversant with the layout of switchgear and transformers and associated equipment up to 11 kV for small substations. They should also be conversant with electrical diagrams, mains records, and similar work. Those with good experience in surveying and planning of mains networks would be considered even if having little experience of substation layouts.

Vacancy No. V/1939/R. NORTH EASTERN SUB-AREA, West Ham District. Candidates should have had a good general and technical education, up to Ordinary National Certificate standard. They should have had considerable experience in transformer chamber layouts, mains records and system diagrams. Knowledge of building construction would be an advantage.

Vacancy No. V/1842/R. SOUTH EASTERN SUB-AREA (at Woolwich, S.E.18). Candidates should have had a good general and technical education and be experienced in one or more of the following subjects, drawing office routine; electrical diagrams; obtaining and recording all mains work and plant layout in transformer chambers.

Vacancy No. V/1980/R. SOUTHERN SUB-AREA (at Beckenham, Kent). Candidates should have a good general and technical education up to Ordinary National Certificate standard, be neat and capable draughtsmen, and experienced in one or more of the following subjects: drawing office routine, electrical diagrams, layout of plant in transformer chambers, mains survey and recording of mains work.

Application forms for these vacancies are obtainable from the Personnel Officer, 46/47, New Broad Street, London, E.C.2. Please enclose addressed envelope and quote reference number of vacancy preferred. 2534

NORTH WESTERN ELECTRICITY BOARD

THIRD ASSISTANT ENGINEER, TECHNICAL AND RESEARCH SECTION, CHIEF ENGINEER'S DEPT., AREA BOARD HEADQUARTERS, MANCHESTER. Duties will include a study of the problems arising on a large distribution system. A wide experience of distribution methods is desirable, together with a good knowledge of protective gear. Ability to prepare concise reports will be an advantage.

Technical qualifications should be up to H.N.C. standard in electrical engineering.

Salary scale £750/£975 p.a. Commencing salary according to qualifications and experience. Class AX/EX, Grade 4. N.J.B. conditions.

Note.—Applicants who applied in response to the previous advertisement of this post need not re-apply.

Applications to Establishment Officer, North Western Electricity Board, Cheetwood Road, Manchester, 8, by 2nd July, 1955.

SECOND ASSISTANT DISTRICT ENGINEER, WEST DISTRICT, STRETFORD. The duties will include the supervision of the erection and maintenance of substation switchgear, laying and jointing of cables, and switching operations on the H.V. and L.V. systems within the District as required. Corporate Membership of the Institution of Electrical Engineers will be an advantage.

Salary scale £755 × £15 to £800 p.a., Grade F.7. N.J.B. conditions.

FOURTH ASSISTANT ENGINEER (ASSISTANT CHARGE ENGINEER), SUB-AREA MAINS ENGINEER'S DEPARTMENT, MANCHESTER. The duties will include assisting the Charge Engineer in carrying out the operational control of a large E.H.V. transmission and distribution system, involving the use of supervisory control and system switching. The system interconnects a number of power stations. Applicants must be prepared to perform shift duties. Preference given to applicants who hold the H.N.C. in Electrical Engineering.

Salary scale £715 × £15 to £760 p.a., Grade L.13. N.J.B. conditions.

GENERAL ASSISTANT ENGINEERS—
(a) OPERATION SECTION (SUB-AREA CONTROL), MANCHESTER.
(b) SUB-AREA MAINS ENGINEER'S DEPARTMENT, MANCHESTER.

Applicants should possess the H.N.C. in Electrical Engineering or an equivalent qualification, and should have had a basic works training of not less than two years. Consideration will also be given to applicants in possession of the O.N.C. who are progressing towards obtaining their H.N.C.

Post (a). The duties will be on a shift basis, and applicants will be required to assist with the carrying out of switching duties on a large E.H.V. and L.V. transmission and distribution system, including supervisory control.

Post (b). Successful candidates will be required to work in Manchester and surrounding districts and will be given the opportunity to gain experience in various sections of the Mains Engineer's Department.

Salary scale (both posts), £475 × £15 to £520 p.a., Grade L.19. N.J.B. conditions.

Applications for the above posts to the Sub-Area Secretary, No. 1 Sub-Area, North Western Electricity Board, Town Hall, Manchester, P.O. Box 493, by 2nd July, 1955.

GENERAL ASSISTANT DISTRICT COMMERCIAL ENGINEER, KENDAL DISTRICT. The successful applicant will be required to assist in the preparation of estimates and the supervision of contract work for commercial, industrial and street lighting schemes. Experience in agricultural applications of electricity would be an advantage. Preference given to applicants who hold the H.N.C. in Electrical Engineering.

Salary scale £475 × £15 to £520 p.a., Grade D.12. N.J.B. conditions.

Applications to Sub-Area Manager, No. 6 Sub-Area, North Western Electricity Board, Castle Green, Kendal, by 2nd July, 1955. 2843

MIDLANDS ELECTRICITY BOARD

APPLICATIONS are invited for the following superannuable posts:—

Central Gloucestershire Sub-Area

PRINCIPAL ASSISTANT (SUB-AREA CENTRAL ACCOUNTS DEPARTMENT). Duties will involve assistance to the Sub-Area Accountant appertaining to all aspects of the work in the Accounts Department. Applicants should possess a recognised accountancy qualification and have had extensive accountancy and administrative experience. Salary £960/£1,080 per annum (N.J.C. Grade 8).

Apply in writing, within fourteen days, stating age, qualifications and experience, present position and salary, to Mr. S. Raybould, Sub-Area Manager, Midlands Electricity Board, 126, London Road, Gloucester.

Worcester and District Sub-Area

THIRD ASSISTANT DISTRICT COMMERCIAL ENGINEER (REDDITCH DISTRICT). Applicants should have a sound technical training and experience in the sale and installation of domestic and commercial electrical equipment and the wiring associated therewith. The duties also include advising consumers in respect of new supplies, extension and alterations. Experience in rural development desirable. Technical qualifications an advantage. Salary £595/£640 per annum (N.J.B. Grade E.10).

Apply in writing, within fourteen days, stating age, qualifications and experience, present position and salary, to Mr. R. Mallet, Sub-Area Manager, Midlands Electricity Board, Whittington, Worcester.

South Staffs and North Worcs Sub-Area

THIRD ASSISTANT DISTRICT COMMERCIAL ENGINEER (STOURBRIDGE DISTRICT). Applicants should have had a sound technical training with practical experience in the sale and installation of domestic and commercial electrical equipment and the wiring associated therewith. Experience of estimating for installation work and the possession of appropriate technical qualifications will be considered an advantage. The duties will include the supervision of contracting work, advising consumers in respect of new supplies, extensions, alterations and estimating for same. Salary £595/£640 per annum (N.J.B. Grade E.10). (The classification for the year 1954/55 is based on unit sales of 94 million units—devalued).

GENERAL ASSISTANT DISTRICT ENGINEER (STOURBRIDGE DISTRICT). Applicants should have suitable technical qualifications and training in engineering duties associated with electrical distribution systems. Salary £475/£520 per annum (N.J.B. Grade E.13). (The classification for the year 1954/55 is based on unit sales of 94 million units—devalued).

Apply in writing, within fourteen days, stating age, qualifications and experience, present position and salary, to Mr. T. G. Keeler, Sub-Area Manager (Ref. CW), Midlands Electricity Board, P.O. Box No. 9, Toll End Road, Tipton.

Wolverhampton and District Sub-Area

GENERAL ASSISTANT DISTRICT COMMERCIAL ENGINEER (WOLVERHAMPTON DISTRICT). Applicants should have had a sound technical training and experience in industrial, commercial and domestic installations. Duties will include supervision of contracting work and consumers' service. Technical qualifications desirable. Salary £675/£720 per annum (N.J.B. Grade H.11).

Apply in writing, within fourteen days, stating age, qualifications and experience, present position and salary, to Mr. D. Holt. Sub-Area Manager, Midlands Electricity Board, 83, Darlington Street, Wolverhampton.

Birmingham and District Sub-Area

GENERAL ASSISTANT ENGINEER (TECHNICAL SECTION, SUB-AREA ENGINEER'S DEPARTMENT). Experience necessary in the preparation of specifications, lay-out of substations, and the planning of, and analysis of loading conditions on, high voltage and low voltage transmission and distribution systems. Technical qualifications desirable. Salary £555/£600 per annum (N.J.B. Grade M.18).

Apply in writing, within fourteen days, stating age, qualifications and experience, present position and salary to Emil Braathen, Sub-Area Manager, Midlands Electricity Board, 14, Dale End, Birmingham, 4.

A. STEPHENS,
Secretary.

2887

YORKSHIRE ELECTRICITY BOARD

No. 5 (Wakefield) Sub-Area

SENIOR ASSISTANT (BILLING AND RENTALS). Applicants should have a thorough knowledge of billing procedure in respect of domestic, commercial and industrial consumers and the maintenance of hire-purchase control. They should be conversant with punched card methods of billing and have experience in the supervision of staff.

The possession of an accountancy qualification will be an advantage.

Salary N.J.C. Grade 6, £795/£25/£870 per annum.

Applications, giving full details of age, qualifications and experience, together with the names of two referees, should be forwarded to the Manager, No. 5 (Wakefield) Sub-Area, Yorkshire Electricity Board, 1a, Denby Dale Road, Wakefield, not later than 7th July, 1955.

No. 4 (Leeds) Sub-Area
LEEDS DISTRICT

FOURTH ASSISTANT DISTRICT ENGINEERS. Applicants should preferably be Graduates of the Institution of Electrical Engineers and have experience in the construction, operation, maintenance and planning of overhead and underground distribution systems in densely populated industrial and residential areas.

Successful applicants must be prepared to reside within the District and undertake standby duties if required.

Salary N.J.B. Class K, Grade 11, £755/£15/£800 per annum.

Applications, giving full details of age, qualifications and experience, together with the names of two referees, should be forwarded to the Manager, No. 4 (Leeds) Sub-Area, Yorkshire Electricity Board, Bramhope, near Leeds, not later than 7th July, 1955.

No. 2 (Huddersfield) Sub-Area
HALIFAX DISTRICT

FOURTH ASSISTANT DISTRICT ENGINEER. Applicants should be Graduate Members of the Institution of Electrical Engineers or possess equivalent qualifications, and have had experience in the design, construction, operation and maintenance of H.V. and L.V. overhead and underground distribution networks, substation plant and ancillary equipment.

Salary N.J.B. Class H, Grade 11, £675/£15/£720 per annum.

Applications, giving full details of age, qualifications and experience, together with the names of two referees, should be forwarded to the Manager, No. 2 (Huddersfield) Sub-Area, Yorkshire Electricity Board, Market Street, Huddersfield, not later than 7th July, 1955.

No. 3 (Sheffield) Sub-Area

ENGINEERING DRAUGHTSMAN. Applicants should be able to prepare, under supervision, final layout building and civil engineering drawings connected with the erection and equipment of electricity distribution substations.

Entry into the grade will be according to capabilities and experience.

Salary N.J.B. Schedule D, Grade 6, £510/£20/£630 per annum.

Applications, giving full details of age, qualifications and experience, together with the names of two referees, should be forwarded to the Manager, No. 3 (Sheffield) Sub-Area, Yorkshire Electricity Board, Commercial Street, Sheffield, not later than 7th July, 1955. 2842

A. V. ROE & CO. LTD.

offer

APPLIED RESEARCH AND DEVELOPMENT WORK

in the following fields for young Graduates in Science or Engineering:—

SERVO-MECHANISMS.
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MECHANICAL ENGINEERING.
HYDRAULIC ENGINEERING.

Attractive salaries depending on experience and qualifications.

This is an opportunity to join new laboratories situated in rural surroundings.

Apply to:—

The Chief Engineer
Weapons Research Division
A. V. ROE & CO. LIMITED
Woodford, Cheshire 299

CENTRAL ELECTRICITY AUTHORITY

London Division

APPLICATIONS are invited for the following superannuable posts. Conditions of service in accordance with N.J.B. Agreement, Schedule A or C. Salary includes London allowance. Qualifications entitling to Graduate Membership of the I.E.E. or I.Mech.E. for posts (a) and Corporate Membership for post (b) an advantage.

(a) SHIFT CHARGE ENGINEER, BARNES GENERATING STATION (Vacancy No. 55/452). Practical experience necessary in efficient operation of power station plant. Salary Class C, Grade 7 = £666 15s. p.a.

(a) SHIFT CHARGE ENGINEER, BECKENHAM GENERATING STATION (Vacancy No. 55/453). Practical experience necessary in efficient operation of power station plant. Salary Class B, Grade 7 = £624 15s. p.a.

(a) ASSISTANT ENGINEER (INSTRUMENTS), FULHAM GENERATING STATION (Vacancy No. 55/454). Applicants should have comprehensive knowledge of the repair and testing of all types of generating station instruments. Salary Class K, Grade 13 = £708 15s. p.a.

(a) ASSISTANT ENGINEER (TECHNICAL), LOMBARD ROAD GENERATING STATION (Vacancy No. 55/455). Applicants should have sound technical training and should be conversant with preparation of routine operating returns, and preferably some knowledge of instrument maintenance. Salary Class F, Grade 12 = £582 15s. p.a.

(a) ASSISTANT SHIFT CHARGE ENGINEER, WEST HAM GENERATING STATION (Vacancy No. 55/456). Sound practical and technical training necessary with practical experience in operation of power station plant. Salary Class H, Grade 9 = £792 15s. p.a.

(b) SHIFT CHARGE ENGINEER, WOOLWICH GENERATING STATION (Vacancy No. 55/457). Sound practical and technical training necessary with practical experience in the operation and maintenance of boilers, turbines and E.H.T. switchgear. Salary Class G, Grade 7 = £829 10s. p.a.

THIRD ASSISTANT ENGINEERS (MECHANICAL), CONSTRUCTION DEPT. DIVISIONAL H.Q. (Vacancy No. 55/458). Applicants seeking technical scope should have experience of plant design and layout of generating stations, specification preparation and contract procedure. Some experience of site erection or plant operation would be an advantage. Qualifications leading to Corporate Membership of the Institution of Mechanical Engineers or equivalent. Salary Class AX/EX, Grade 4 = £787 10s./£1,023 15s. p.a. (Applicants for Vacancy No. 55/319 will be considered and need not re-apply.)

Applications, quoting vacancy number, may be made on form obtainable from Divisional Secretary, Central Electricity Authority, London Division, P.O. Box 136, Generation House, Great Portland Street, London, W.1, and be received within 14 days of this advertisement.

2845

CITY OF CARDIFF

Appointment of Electrical Engineering Assistant

APPLICATIONS are invited for the following appointment in the City Surveyor's Department

ELECTRICAL ENGINEERING ASSISTANT, A.P.T. Grade 3 (£600-£725 per annum).

Candidates should possess the minimum qualifications and experience prescribed by the National Joint Council for Local Authorities' Administrative, Professional, Technical and Clerical Services for posts in the above mentioned grade.

General conditions of appointment may be obtained from the undersigned.

The council will assist in providing housing accommodation for a period for the successful applicant.

Applications, accompanied by the names and addresses of three referees and endorsed "Electrical Engineering Assistant, A.P.T. Grade 3" must be deliverd to me not later than 6th July, 1955.

S. TAPPER-JONES,
Town Clerk.

City Hall,
Cardiff.
June, 1955.

2857

CENTRAL ELECTRICITY AUTHORITY

East Midlands Division

APPLICATIONS are invited for the following positions within the Division:—

SECOND ASSISTANT ENGINEER (MECHANICAL), GENERATION CONSTRUCTION) DEPARTMENT (Vacancy No. 101/55/ER). Preference will be given to applicants who hold a degree in Mechanical Engineering, are Corporate Members of the Institution of Mechanical Engineers, or possess equivalent qualifications. Some electrical training and experience will be a recommendation.

They should be experienced in the design and construction of turbo-alternators, boilers, coal and ash handling plant, high pressure steam and water piping and other ancillary work.

Experience in the preparation of specifications and estimates and a knowledge of thermodynamics and hydraulics will be an advantage.

Salary will be within Class AX/DX, Grade 2 (£950-£1,165 per annum) of the National Joint Board Agreement.

Closing date for receipt of applications, 11th July, 1955.

THIRD ASSISTANT ENGINEER (MECHANICAL), GENERATION (CONSTRUCTION) DEPARTMENT (Vacancy No. 102/55/ER). Applicants should have had a fundamental training in mechanical engineering, including workshops, and should preferably have had experience in the manufacture, erection, maintenance and operation of mechanical plant as installed in modern power stations. Preference will be given to candidates who possess a university degree or equivalent qualification in Mechanical Engineering.

Salary will be within Class AX/DX, Grade 4 (£750-£950 per annum) of the National Joint Board Agreement.

Closing date for receipt of applications, 11th July, 1955.

GENERAL ASSISTANT ENGINEER (CHEMIST), STAYTHORPE POWER STATION, NEAR NEWARK (Vacancy No. 100/55/ER). Candidates must have had a sound technical training and some previous laboratory experience and should hold the Ordinary National Certificate in Chemistry (or equivalent qualifications).

Salary will be within Class J, Grade 16 (£515 × £15 to £560 per annum) of the National Joint Board Agreement.

Closing date for receipt of applications, 11th July, 1955.

These appointments will be pensionable within the terms and provisions of the Central Electricity Authority and Area Boards Superannuation Scheme.

Applications should be submitted on the official form A.E.6/ACT which may be obtained from the Divisional Establishments Officer, Central Electricity Authority, P.O. Box 25, Barker Gate, Nottingham, and should be returned to the undersigned by the date stated. Please quote Vacancy Number.

L. F. JEFFREY,
17th June, 1955. Divisional Controller.
2862

GOVERNMENT OF BAHRAIN

Shift Engineers and Electrical Engineering Assistants for the Electricity Department

APPLICATIONS are invited for the above appointments with the Government of Bahrain, Persian Gulf.

Candidates should be technically qualified up to at least Ordinary National Certificate standard with previous experience in a public electricity supply undertaking.

The salary offered is up to Rs.1300/- per month according to experience (one Rupee = 1s. 6d.) and contracts are for four years.

Furnished "bachelor" quarters, medical attention, electricity and water are provided free, but married accommodation will not be available for one year.

Leave is earned at the rate of 2½ months for each completed year of service, with two free return air passages during each 4-year contract, and there is a provident fund.

Applications giving full particulars of age, training, qualifications and experience should be forwarded by air mail to D. Brammer, A.I.E.E., A.M.Amer.I.E.E., State Engineer, Government of Bahrain, Bahrain, Persian Gulf.
2836

CENTRAL ELECTRICITY AUTHORITY

Southern Division

APPLICATIONS are invited for the following posts:—

SHIFT CHARGE ENGINEER, Poole Generating Station (S/13.678). Applicants should possess technical qualifications admitting to corporate membership of a recognised professional institution, and have had previous operating experience involving responsibility in a large modern generating station with high temperatures and pressures and preferably with pulverised fuel equipment.

Salary N.J.B. Grade J.7, £900/£975.

SHIFT CHARGE ENGINEER, Oxford Generating Station (S/13.677). Applicants should be in possession of technical qualifications admitting to corporate membership of a recognised professional institution, have had previous experience in an electricity generating station, and preferably have had manufacturing works experience.

Salary N.J.B. Grade D.7, £675-£720.

ASSISTANT ENGINEER (Instruments), Earley Generating Station, Reading (S/13.679). Candidates should have previous experience of modern generating station plant and a sound knowledge of instruments and other measuring apparatus used in generating stations.

Applicants should have had a sound technical training and should preferably possess qualifications leading to corporate membership of an appropriate professional institution, or hold equivalent qualifications.

Salary N.J.B. Grade G.10, £675-£720.

DRAUGHTSMAN, Poole Generating Station (S/13.676). Applicants should be experienced in the preparation and issue of diagrams, drawings and charts, and also in the maintenance of drawings filing system.

Salary N.J.C. Grade 2, £525-£585.

GENERAL ASSISTANT ENGINEERS (S/13.674). Applicants should have served an apprenticeship or had practical training suitable to the industry. They should possess a sound general and technical education and preference will be given to those possessing a Higher National Certificate (or those nearing completion of H.N.C. courses). Opportunities are available for general assistant engineers to complete their studies and gain wide experience with good prospects of promotion.

The duties of those appointed will vary, but will include as a general rule the operation and control, under supervision, of generating plant.

Vacancies also exist for those who wish to specialise in maintenance of electrical and mechanical generating plant, transmission lines, substations and cables, or generating station construction work.

Salary N.J.B. within scales £475-£640.

Special application forms for each post, obtainable from P. D. A. Oliver, Divisional Secretary, 111, High Street, Portsmouth, should be returned by 6th July. Please quote reference E.R.
2886

IMPERIAL CHEMICAL INDUSTRIES LIMITED

Wilton Works

ASSISTANT TECHNICAL OFFICER
DRAUGHTSMEN
MECHANICAL, ELECTRICAL, STRUCTURAL, CIVIL, INSTRUMENTATION.

There are several vacancies in each category. Applicants should have the appropriate National Certificate and previous drawing office experience.

Appointments are to permanent staff.

Staff pension and profit sharing schemes.

Five-day/39-hour week. Recreation club with good sporting facilities.

Housing assistance possible in approved cases.

Write for application form to Staff Officer, Imperial Chemical Industries Ltd., Wilton Works, Middlesbrough, quoting advertisement reference ICI/X/243/c.
2694

CENTRAL ELECTRICITY AUTHORITY

Yorkshire Division

APPLICATIONS are invited for the following appointments at Wakefield B power station. The station will have an ultimate capacity of 240 MW.

DEPUTY STATION SUPERINTENDENT. Salary £1,110-£1,200 per annum, Class H, Grade 3, National Joint Board Agreement.

Applicants should have had a wide experience in the administration and operation of a large modern power station and should preferably be Corporate Members of the Institution of Mechanical Engineers and/or Electrical Engineers, or hold equivalent qualifications.

MAINTENANCE ENGINEER (MECHANICAL). Salary £900-£975 per annum, Class H, Grade 6, National Joint Board Agreement.

Applicants should have had wide experience in the maintenance and administration of a large modern power station. Possession of recognised technical qualifications in Mechanical Engineering would be an advantage.

SHIFT CHARGE ENGINEERS. Salary £840-£900 per annum, Class H, Grade 7, National Joint Board Agreement.

Applicants should have operating experience with large capacity high pressure turbo-alternators and boilers, and should preferably possess technical qualifications admitting to Corporate Membership of the Institution of Mechanical Engineers and/or Institution of Electrical Engineers.

STATION SHIFT CONTROL ENGINEERS. Salary £715-£760 per annum, Class H, Grade 10, National Joint Board Agreement.

Applicants should have had a sound training and practical experience in a modern power station control room. The possession of recognised technical qualifications in Electrical Engineering would be an advantage.

GENERAL ASSISTANT ENGINEERS. Salary £475-£520 per annum, Class H, Grade 16, National Joint Board Agreement.

Preference will be given to candidates possessing recognised technical qualifications or who are at present following a course of study with the object of obtaining such qualifications.

Housing accommodation may be available.

Application forms obtainable from Divisional Secretary (Establishments), Central Electricity House, St. Mary's Road, Leeds, 7, to be returned within 14 days of the appearance of this advertisement.

G. A. VOWLES,
Divisional Controller.
2858

FEDERAL GOVERNMENT OF NIGERIA

Assistant Electrical Engineer, Railway Department

TO be responsible to the Electrical Engineer for all electrical branches of the department, viz., transformer substation, maintenance and repairs of all electrical equipment in workshops, house wiring and maintenance, train lighting, wharf plant, small power stations at outside depots, and station and yard lighting where provided.

Appointment is either pensionable on probation in the salary range £910-£1,560 per annum gross, or on contract in the range £1,116-£1,898 per annum gross plus a gratuity of £150 per annum payable on satisfactory completion of contract. Free 1st class passages for the officer, his wife, and an annual maintenance allowance of up to £75 each is payable in respect of a maximum of two children. Furnished quarters provided if available at low rental. Leave is granted at the rate of 7 days per completed month of resident service.

Candidates, between 30 and 35, should be Associate Members of the Institution of Electrical Engineers, or have passed or be exempt from Parts A & B of the Institution's examination, and have served an apprenticeship with a reputable electrical engineering firm. They should have had experience in workshops and drawing office with particular emphasis on installation of H.T. and L.T. power equipment and distribution systems, and have had some administrative experience.

Apply in writing to the Director of Recruitment, Colonial Office, Great Smith Street, London, S.W.1, giving briefly age, qualifications and experience. Mention the reference number BCD.110/14/030/D11.
2811

EASTERN ELECTRICITY BOARD

APPLICATIONS are invited for the following appointments in the Northmet Sub-Area. The successful candidates will be required to contribute to a superannuation scheme and may be required to undergo a medical examination.

ENFIELD DISTRICT

SENIOR SALES REPRESENTATIVE (115/55.R.). Candidates must be of good address and have had sound practical training with experience in electrical installation work for domestic and commercial premises. A good knowledge of electric water heating and ability to prepare wiring specifications and estimates is essential. Salary, N.J.C. Grade 2 (£525-£585), plus London weighting.

GENERAL ASSISTANT ENGINEERS. Candidates should have had a good general and technical education and should possess the Higher National Certificate in Electrical Engineering or an equivalent qualification. Salary, N.J.B. Class F, Grade 13 (£515-£560), plus London weighting.

Apply for both positions by letter, within 14 days, to the District Manager, Eastern Electricity Board, 40, Church Street, Enfield, Middlesex.

WOOD GREEN AND STEVENAGE DISTRICTS

FOURTH ASSISTANT ENGINEERS (113 and 116/55.R.). Candidates should have had a sound technical training and experience in the construction, operation and maintenance of H.V. and L.V. distribution systems including substations. Salary, N.J.B. Class F, Grade 11 (£595-£640), plus London weighting for the vacancy in Wood Green District.

Apply by letter, within 14 days, to the appropriate District Manager, Eastern Electricity Board, at the following addresses:—(i) 13/27, Station Road, Wood Green, London, N.22. (ii) 38, High Street, Stevenage, Herts. 2889

NORTH EASTERN ELECTRICITY BOARD

APPLICATIONS are invited for the following appointments subject to N.J.B. Agreement for Electricity Supply Industry:—

Area Board Headquarters

FOURTH ASSISTANT ENGINEER, Operation and Maintenance Section, for general duties in System Protection Sub-Section. Applicants should possess H.N.C. or equivalent qualification. Salary Schedule C, Grade 6, £600/£785.

Wear Sub-Area

SECOND ASSISTANT DISTRICT ENGINEER, JARROW DISTRICT. Applicants must be qualified electrical engineers with sound practical training and experience in construction, operation and maintenance of overhead and underground networks and associated plant and equipment. Salary Schedule A, Class E, Grade 7, £715/£760.

Tees Sub-Area

FOURTH ASSISTANT ENGINEER, Commercial Officer's Department, Stockton-on-Tees. Applicants should be suitably qualified electrical engineers, with experience in administration of a domestic apparatus repairs workshop and the servicing of all types of domestic appliances. Salary Schedule A, Class K, Grade 13, £675/£720.

York Sub-Aea

SENIOR ASSISTANT ENGINEER, YORK. Applicants should be qualified engineers with wide experience in all classes of electrical engineering operation and maintenance work, including installation and testing of protection equipment and plant. Salary Schedule A, Class G, Grade 4, £975/£1,050.

Applications, stating age, qualifications and experience, to be received by the Secretary (Establishments), North Eastern Electricity Board, G.P.O. Box No. 117, Carliol House, Newcastle upon Tyne, within ten days of the appearance of this advertisement. 2861

A. H. HUNT (CAPACITORS) LIMITED

require DRAUGHTSMEN, preferably with mechanical and electrical experience, for work on special-purpose machines.

Write giving age and previous experience to Personnel Manager, A. H. HUNT (Capacitors) LIMITED, Bendon Valley, Garratt Lane, Wandsworth, London, S.W.18. 88

THE UNITED KINGDOM ATOMIC ENERGY AUTHORITY

Aldermaston, Berks

requires ENGINEERS GRADE III to supervise a small team of technicians in the planning and execution of electrical engineering work associated with home and overseas trials of atomic weapons, involving short tours of overseas duty.

The duties will include the provision of dependable A.C. and D.C. stabilised electrical supplies to isolated sites, and the installation, testing, operation and maintenance of such supplies of prime movers throughout the trials period.

Applicants should have served a recognised engineering apprenticeship and be Corporate Members of the Institution of Electrical Engineers or possess equivalent qualifications. They should have a sound theoretical knowledge and wide practical experience of the distribution of electrical supplies, of generators up to 100 kVA, internal combustion engines, protective gear and lightning and static protection and battery maintenance. A knowledge of electronics would be an advantage.

Salary £659-£1,065 p.a. (Male).

Superannuation: The successful applicants will be required to join the Authority's contributory scheme.

Housing accommodation will be available within a reasonable period for married officers who live outside the radius of the Establishment's transport facilities, or alternatively the Authority may be able to assist successful applicants in the purchase of a house. During this period a lodging allowance may be payable.

Requests for application forms by postcard to Senior Recruitment Officer, A.W.R.E., Aldermaston, Berks. Quote ref. 676/WGE/48. 2790

AIR MINISTRY

require STATION ENGINEERS (G.D.) and STATION ENGINEERS (Mech.) at Royal Air Force and Ministry of Transport and Civil Aviation stations.

Qualifications required: (a) Ordinary National Certificate in Electrical or Mechanical Engineering, or show that an equivalent standard of technical education has been reached; (b) recognised apprenticeship in electrical or mechanical engineering with firm or establishment of good repute; (c) three years' employment in electrical or mechanical engineering, preferably on operation and maintenance of mine, factory or workshop plant and services. Preference will be given to applicants who have had supervisory duties subsequent to (b) and (c).

Work will consist of installation, operation and maintenance of high and medium-voltage electrical distribution systems, electrical installations, generating plant, steam and hot water heating systems and miscellaneous works plant, tools and equipment.

Commencing salary according to age, qualifications and experience on range from £535 to £772.

Liability for tours of duty overseas for which special allowance payable in addition to higher salary. Appointments non-pensionable. Only natural-born British subjects.

Write, giving age, full details of qualifications and experience, to AB.1255, Appointments Officer, Ministry of Labour & National Service. 1-6, Tavistock Square, London, W.C.1. No original testimonials should be sent. Only candidates selected for interview will be advised. 301

BRITISH ENGINE BOILER & ELECTRICAL INSURANCE CO. LTD.

24, Fennel Street, Manchester, 4

THE company requires additional electrical plant inspectors. Permanent positions carrying progressive salary scale £600 to £850 and non-contributory pension. Candidates, age 26 to 30 years, with apprenticeship in the manufacture or repair of electrical machinery, and preferably with subsequent experience of industrial use of electrical machinery, and who have gained the Higher National Certificate in Electrical Engineering or are Graduates of the Institution of Electrical Engineers, are invited to apply in own handwriting, stating age, qualifications and experience. 2846

THE UNITED KINGDOM ATOMIC ENERGY AUTHORITY

Aldermaston, Berks

requires EXPERIMENTAL OFFICERS for the following duties:—

(1) 667/WGE/48. To assist in static strength tests of weapon assemblies and components, to carry out model experiments and to develop, maintain and use electronic recording gear.

(2) 668/WGE/48. To assist in dynamic strength tests of weapon assemblies and components, and to use and maintain electronic recording gear.

The minimum qualification for both posts is Higher School Certificate (Science) or equivalent, but candidates must also have had experience of electronic instrumentation. Applicants should be at least 26 years of age. For Post (1) experience of experimental stress analysis would be an advantage. For Post (2) experience of experimental stress analysis in dynamic applications would be an advantage.

Salary £775-£945 p.a. (male). The successful applicants will be required to join the Authority's contributory superannuation scheme.

Housing accommodation will be available within a reasonable period for married officers who live outside the radius of the Establishment's transport facilities, or alternatively the Authority may be able to assist successful applicants in the purchase of a house. During this period a lodging allowance may be payable.

Requests for application forms by postcard to Senior Recruitment Officer, A.W.R.E., Aldermaston, Berks, quoting the appropriate reference number. 2809

CENTRAL ELECTRICITY AUTHORITY

South Western Division

TECHNICAL STAFF VACANCIES:—

(1) ASSISTANT ENGINEER (Efficiency and Test), Portishead "B" Power Station. N.J.B. J.7, £900-£975.

(2) ASSISTANT ENGINEER (Instruments), Portishead "B" Power Station. N.J.B. J.10, £755-£800.

(These gradings are subject to confirmation by the District and National Joint Boards.)

(3) GENERAL ASSISTANT ENGINEER (Control), Hayle Power Station. N.J.B. F.14, £475-£520.

Superannuation.

Applicants for (1) should possess H.N.C., be experienced in operation and investigation of modern power station plant and familiar with use of testing equipment. Large P.F. boiler and auto combustion control experience desirable.

For (2) should have experience of modern power station plant, with sound technical training and good practical knowledge of construction, repair and testing of instruments and automatic controls.

For (3) should possess O.N.C. in Electrical or Mechanical Engineering or equivalent. Previous power station experience an advantage.

Application forms obtainable from Divisional Secretary, 26, Oakfield Road, Bristol, 8, to be completed and returned by 2nd July, 1955. 2840

SOUTH OF SCOTLAND ELECTRICITY BOARD

Southern Area

SECOND ASSISTANT DISTRICT ENGINEER (Berwick District). N.J.B. Grade D.7, £675 × £15 to £720.

THIRD ASSISTANT DISTRICT ENGINEERS (Two) (Berwick District). N.J.B. Grade D.9, £595 × £15 to £640.

Applicants should have sound technical training and experience in operation and maintenance of overhead and underground distribution systems. Technical qualifications desirable. The engineers appointed will be required to reside in or near Berwick-upon-Tweed.

Applications stating age, qualifications and experience should reach the undersigned by 5th July.

G. H. SANKEY,
Area Manager.

P.O. Box 2,
High Street, Galashiels. 2841

LONDON ELECTRICITY BOARD

Vacancies: Senior Draughtsmen

APPLICATIONS are invited for the following vacancies. These posts are permanent and superannuable and are graded under Schedule D of the National Joint Board Agreement as Grade 5, £672 to £777 per annum inclusive of London allowance.

Vacancy No. V/1966/R. Western Sub-Area (at Eccleston Place, S.W.1). Candidates must have had a sound general education with technical qualifications equivalent to the Higher National Certificate in Electrical Engineering. They should have had some workshop training and mechanical experience, and must be conversant with the layout of switchgear and plant up to 11kV for small substations, including preparation of associated electrical diagrams. A knowledge of building and R.C. structures, whilst not essential, would be an advantage.

Vacancy No. V/1979/R. Southern Sub-Area (at Beckenham, Kent). Candidates should have had a good general and technical education and be experienced in one or more of the following subjects: building and civil engineering design, engineering drawing, plant layout in substations. In addition the applicant should be capable of supervising engineering draughtsmen and/or junior draughtsmen, if required.

Application forms for both the foregoing vacancies are obtainable from the Personnel Officer, 46/7, New Broad St., London, E.C.2. Please enclose addressed envelope and quote reference number of vacancy preferred. 2741

ENGLISH ELECTRIC AT STAFFORD

ELECTRICAL ENGINEERS
FOR ROLLING MILL SECTION.

METAL INDUSTRIES DIVISION.

VACANCIES exist in the Engineering and Control Gear Sections for a number of young electrical engineers of either B.Sc. or H.N.C. standard who have served a recognised apprenticeship, preferably in a manufacturing industry. Previous experience, either manufacturing or operating, of steelworks or industrial machines and associated control gear would be an advantage.

These are attractive positions for young men who have completed their National Service and wish to continue their career on interesting work in an expanding section of the company's activities, concerned with all sizes and types of rolling mill drives and associated plant.

Good salaries are offered to the successful applicants and the positions are permanent, progressive and pensionable. Please reply giving full personal particulars, and quoting Ref. 769F, to Dept. C.P.S., 336/7, Strand, London, W.C.2.

2713

SOUTH OF SCOTLAND ELECTRICITY BOARD

APPLICATIONS are invited for the post of ASSISTANT ENGINEER in the Transmission Section of the Chief Engineer's Department at Glasgow.

Applicants should have the minimum qualification of a Higher National Certificate in Electrical Engineering and also experience in the electricity supply industry and/or with a firm of electrical manufacturers.

Salary will be in accordance with N.J.B. Schedule C, Class AX/DX, Grade 6, £600/£785 per annum.

The position is superannuable. Application should be made on the standard application form which may be obtained from the undersigned, and returned not later than 9th July, 1955.

J. MEEK,
Secretary.

P.O. Box 173,
351, Sauchiehall Street,
Glasgow, C.2.
18th June, 1955. 2864

CENTRAL ELECTRICITY AUTHORITY

East Midlands Division

APPLICATIONS are invited for the following position within the Division :—

SENIOR DRAUGHTSMAN (CIVIL), CONSTRUCTION DEPARTMENT (Vacancy No. 99/55/ER). Candidates should have experience in the preparation of detail drawings and in the design of one or more of the following subjects :—

Reinforced concrete structures.
Piled and slab foundations for heavy components.
Cable subways, bridges and culverts.

The salary will be in accordance with Grade 4 (£750 × £20 to £850 per annum) or Grade 5 (£640 × £20 to £740 per annum) of Schedule D of the National Joint Board Agreement.

Closing date for receipt of applications, 4th July, 1955.

This appointment will be pensionable within the terms and provisions of the Central Electricity Authority and Area Boards Superannuation Scheme.

Applications should be submitted on the official form A.E.6/ACT, which may be obtained from the Divisional Establishments Officer, Central Electricity Authority, P.O. Box 25, Barker Gate, Nottingham, and should be returned to the undersigned by the date stated. Please quote vacancy number.

L. F. JEFFREY,
Divisional Controller.
2839

SOUTH EASTERN ELECTRICITY BOARD

ASSISTANT DISTRICT COMMERCIAL ENGINEER, Eastbourne District.

Salary £595-£640 p.a. under N.J.B. Class E, Grade 10. Superannuable. Applicants should be suitably qualified and have experience in installation, contracting and consumer service, including the preparation of estimates and specifications for domestic, commercial and industrial installations, and the supervision of such work.

Applications on forms from J. E. Winborne, District Manager, SEEBoard, Electric House, Grove Road, Eastbourne, by 6th July, 1955.

SENIOR SALES REPRESENTATIVE (Male), Sutton District.

Salary £525 × £20 to £585 per annum, plus London Weighting under N.J.C. Grade 2. Superannuable. The person appointed will be required to give advice on supply matters, tariffs and appliance sales and installation for domestic and small commercial consumers. Applicants must be thoroughly conversant with house wiring and all types of domestic electrical appliances and in addition to acting as an outside representative must be prepared to carry out general showroom duties in any showroom within the District.

Applications, naming 2 referees, on forms from W. B. Hayden, M.I.E.E., Sutton Manager, SEEBoard, 52/54, High Street, Sutton, Surrey, by 6th July, 1955.

A. L. BURNELL,
Secretary.
2856

CITY OF BATH EDUCATION COMMITTEE

City of Bath Technical College
Principal: A. H. Yates, B.Sc., B.Sc.(Eng.), A.F.R.Ae.S.

DEPARTMENT OF ENGINEERING AND SCIENCE

REQUIRED for September, 1955, a full-time ASSISTANT-TEACHER for Electrical subjects with reference to Electrical Installation work.

Good technical qualification and industrial experience required.

Burnham Scale (Grade A), £450 by £18 to £725. The starting point on the scale depends on previous experience.

Forms of application (to be returned immediately) and full particulars from the Principal, Lower Borough Walls, Bath.

H. W. BRAND,
Director of Education.
Guildhall,
Bath. 2774

ELECTRICAL AND MECHANICAL ENGINEERS

SUNVIC CONTROLS LTD. (a subsidiary of Metropolitan-Vickers Electrical Co. Ltd.) have the following vacancies in their new Development and Production Units at Harlow.

(1) GRADUATE ENGINEER with general works training and experience on the design of domestic control equipment. Applicants must be familiar with modern methods of manufacture and have some knowledge of mass production techniques.

(2) GRADUATE ENGINEER with experience in design or development of electro-mechanical mechanisms and their application to instrument problems.

The above positions are permanent and offer excellent prospects for promotion in a team engaged on the development and manufacture of a wide range of new instruments. Salaries will be according to age and ability. The company's contributory pension scheme applies in all cases, and housing is available if required.

Reply in writing, giving full particulars of age, experience, qualifications and present situation, to Chief Engineer, Sunvic Controls Ltd., Harlow, Essex. 230

CENTRAL ELECTRICITY AUTHORITY

North Eastern Division

APPLICATIONS are invited for the appointment of THIRD ASSISTANT ENGINEER (Calculations and Investigations), Technical Department, Newcastle upon Tyne, 1.

Candidates should have technical qualifications of at least Graduate I.E.E. standard and experience connected with a large interconnected power system.

The engineer appointed will be required to carry out system fault and load flow calculations, and assist in planning and the preparation of reports. Experience in similar work is very desirable.

The salary for this appointment (which is superannuable) will be in accordance with the National Joint Board Agreement, Schedule C, Grade 4 (£750-£950 per annum) and will commence at a point commensurate with qualifications and experience.

Forms of application may be obtained from Divisional Establishments Officer, Central Electricity Authority, North Eastern Division, Carliol House, Newcastle upon Tyne, 1, to whom they should be returned to arrive not later than 9th July, 1955. 2860

CENTRAL ELECTRICITY AUTHORITY

Eastern Division

APPLICATIONS are invited for the following post at Ipswich, Constantine Road, Generating Station.

STATION SHIFT CONTROL ENGINEER. Salary, Class D, Grade 10, £555 × £15 to £600 per annum.

Applicants should have reached the standard of Ordinary National Certificate in Electrical Engineering, or its equivalent, have experience in the operation of a switchboard at a generating station and be fully conversant with high voltage switching operations and protective systems.

Applications stating age, details of experience and qualifications should be sent to the Controller, Central Electricity Authority, Eastern Division, Northmet House, Southgate, London, N.14, to arrive not later than 1st July, 1955.

W. N. C. CLINCH,
Controller.
2859

EASTERN ELECTRICITY BOARD

112/55.R.

FITTER (Electrical), St. Albans District, Northmet Sub-Area. Rate of pay at present 4s. 1d. per hour for a 44-hour week, and conditions of service will be in accordance with the N.J.I.C. Agreement for the Electricity Supply Industry.

Apply by letter to the District Manager, Eastern Electricity Board, St. Peter's Street, St. Albans, Herts, within 14 days of the appearance of this advertisement. 2884

CENTRAL ELECTRICITY AUTHORITY

North Eastern Division

APPLICATIONS are invited for the appointment of GROUP CHEMIST (North), with headquarters at Carliol House, Newcastle upon Tyne, 1.

Candidates should possess an honours degree or A.R.I.C.; have considerable experience in power station chemistry, and a good knowledge of modern analytical and theoretical chemistry.

The successful candidate will be responsible to the Divisional Chemist for the technical direction of all the laboratories in the Northern Group of the Division.

The salary for the appointment (which is superannuable) will be in accordance with the National Joint Board Agreement, Schedule C, Grade 2 (£950-£1,165 per annum) and will commence at a point commensurate with qualifications and experience.

Forms of application may be obtained from Divisional Establishments Officer, Central Electricity Authority, North Eastern Division, Carliol House, Newcastle upon Tyne, 1, to whom they should be returned to arrive not later than 16th July, 1955. 2825

CENTRAL ELECTRICITY AUTHORITY

Senior Civil Engineer, Chief Engineer's Department, Headquarters

APPLICATIONS are invited for the appointment of a SENIOR CIVIL ENGINEER in the Chief Engineer's Department at Headquarters in London.

The salary for the appointment, which is superannuable, will be within the range £2,400-£2,900 per annum.

Candidates should be Corporate Members of the Institution of Civil Engineers and have wide experience in the design and construction of large civil engineering works, preferably associated with thermal generating stations and hydro-electric projects.

Duties will include the critical examination of civil engineering problems involved in the construction of new and extension of existing generating stations.

Applications, stating age, qualifications, experience, present position and salary, to be forwarded to D. Moffat. Director of Establishments, Winsley Street, London, W.1, to be received not later than 8th July, 1955. Quote AE/610. 2844

BAHRAIN PETROLEUM COMPANY LTD.

APPLICATIONS are invited from GRADUATE ENGINEERS for the following vacancies in an expanding organisation:—

(a) CHEMICAL ENGINEERS, preferably experienced in design of pressure vessels, distillation columns, heat exchangers, pumping installations, etc., as encountered in petroleum refineries or other heavy chemical industrial plants. Recent graduates accepted to train for advancement.

(b) MECHANICAL ENGINEERS with similar experience to (a), recent graduates also being accepted for these posts.

(c) CIVIL ENGINEERS (Structural), with experience in design of steel and R.C. supporting structures and buildings. Recent graduates also accepted.

Salaries according to qualifications and experience with adequate living allowance, medical attention and air conditioned quarters in addition. Pension scheme and kit allowance. Living costs are low and savings high. Age limits 23 to 35. Apply with fullest particulars qualifications and experience, to—Box 185.

CONTACTOR SWITCHGEAR LIMITED

AS a result of further expansion ENGINEERS are required for both Engineering and Estimating Departments for control gear applications up to 1,000 h.p. low and high tension.

The company operates a contributory pension scheme and will share cost of removal in approved cases.

Applicants should have completed their National Service and be preferably not over 45.

Write in confidence, stating age, experience, and salary required, to the Secretary, Blakenhall, Wolverhampton. 2865

CENTRAL ELECTRICITY AUTHORITY

South Eastern Division

FOURTH ASSISTANT ENGINEER to act as Instructor at the Training Centre at Brighton, which comprises workshops, lecture rooms, etc. Candidates must have served a recognised workshop apprenticeship and have experience of instructing in the use of hand and machine tools, fitting and turning, methods of heat treatment, elementary electrical practice, etc.

The duties will include the supervision and instruction of craft and student apprentices and graduate trainees in basic workshop practice, the necessary demonstrating, lecturing and general clerical work in connection with the Centre.

N.J.B. conditions of service, Class AX/DX, Grade 6, £600-£785 per annum.

Applications giving details of education, present position, experience, etc., should be received by the Establishments Officer, Central Electricity House, Lower Ham Road, Kingston-upon-Thames, Surrey, to arrive by 4th July, 1955. 2850

IMPERIAL CHEMICAL INDUSTRIES LIMITED, WILTON WORKS

ENGINEERS

MECHANICAL. STRUCTURAL.
ELECTRICAL. CIVIL.

PERMANENT STAFF APPOINTMENTS await young Graduate Engineers with good Honours Degrees. The Wilton Works Site of 2,000 ACRES IN COURSE OF DEVELOPMENT in addition to providing general and varied experience in modern engineering has its own special problems in design and materials.

The organisation is expanding and has opportunities for technical training followed by further training towards higher management.

Situated in the North Riding of Yorkshire, near the coast, Wilton offers first-class working conditions, five-day working week, pension fund, and full recreational facilities.

Write for application form to Staff Officer, Imperial Chemical Industries Limited, Wilton Works, Middlesbrough, Yorkshire, quoting advertisement reference ICI/X/226/d. 2745

AUTOMATIC TELEPHONE & ELECTRIC COMPANY LTD. LIVERPOOL, 7

Communication Engineers & Draughtsmen

THE Transmission Department invite applications in senior and junior categories for LINE TRANSMISSION LABORATORY ENGINEERS and APPARATUS DESIGN ENGINEERS, and also DRAUGHTSMEN, with experience in telecommunication and light current engineering. Expanding programmes offer progressive opportunities in interesting work.

Specialist experience in any branch of line transmission engineering is desirable for some of the posts.

The positions offered are on the company staff, with contributory pension fund and usual staff conditions. Assistance in establishment in the Liverpool area will be given in approved cases.

Applicants should write to the Personnel Manager, Automatic Telephone & Electric Co. Ltd., Strowger Works, Edge Lane, Liverpool, 7, giving full details of age, experience and qualifications. 95

BRITISH STANDARDS INSTITUTION

ELECTRICAL ENGINEERS are required by the British Standards Institution for work in connection with the approval of all types of electrical equipment for export to Canada. Applicants should have served an apprenticeship and have technical qualifications equivalent to graduate membership of I.E.E.; preference will be given to corporate members.

The positions are pensionable and the salary will be in accordance with qualifications and experience.

Apply Establishment Officer, British Standards Institution, 2, Park Street, London, W.1. 2785

LONDON ELECTRICITY BOARD

Engineer (Operation and Maintenance)

APPLICATIONS are invited for the above position in the Stepney/Bethnal Green District of the Northern Sub-Area.

Applicants should have had a sound technical education up to at least National Certificate standard, preferably being Corporate Members of the I.E.E., and possess a practical experience of all branches of engineering work associated with the organisation of a District distribution department, particularly in regard to mains and substations work on D.C. and A.C. systems.

The post is graded under Schedule A of the National Joint Board Agreement as Class F, Grade 11, £624 15s. per annum rising to £672 per annum inclusive of London allowance.

Application forms obtainable from Personnel Officer, 46/7, New Broad Street, London, E.C.2, to be returned completed by 4th July, 1955. Please enclose addressed envelope and quote ref. V/1976/R. 2775

TECHNICAL WRITERS

required by large precision instrument manufacturers in the following fields:—

Boiler house and process control gear.
Aviation instruments.
Radar and other electronic navigation equipment.

An engineering background is desirable but not essential, and applicants should be familiar with at least one of the fields mentioned above, and be able to write technical service literature.

Salaries are in accordance with experience and qualifications, but are based on a generous scale. The positions are permanent, and favourable pension and payment during illness arrangements, etc., are in operation.

Applications, which can be made in strictest confidence, should be addressed to the Personnel Manager, Kelvin & Hughes Ltd., New North Road, Barkingside, Essex. 2777

NATIONAL COAL BOARD

invite applications for a superannuable appointment as ASSISTANT ENGINEER (Electrical) in the Power Generation Section of Production Engineering Branch at London Headquarters.

Applicants should have experience in the layout and installation of switchgear, transformers and cables, and in the preparation of specifications for this equipment. Appointment will be according to qualifications and experience, in the salary range £500-£1,000 per annum, but not less than £650 at age 25.

Write, giving full particulars (in chronological order) of age, education, qualifications and experience (with dates), to National Coal Board, Establishments (Personnel), Hobart House, Grosvenor Place, London, S.W.1, marking envelope SS/15. Original testimonials should not be forwarded. Closing date 16th July, 1955. 2812

TRANSFORMER DRAUGHTSMEN

SENIOR men required with experience of units up to 10 MVA and 88 kV, and Juniors with some experience up to 1,000 kVA. Men who have had general electrical draughting experience will also be considered for training.

Write, giving details of age, experience, qualifications and salary required, to — The Technical Director, Bryce Electric Construction Co. Ltd., Kelvin Works, Hackbridge, Wallington, Surrey.

2810

JOHNSON & PHILLIPS LTD.

Cable Works Manager

JOHNSON & PHILLIPS Ltd. require a MANAGER for their paper & rubber cable works. Those interested should send full details of their training and career to the Managing Director. All correspondence will be treated in absolute confidence. — Johnson & Phillips Limited, Charlton, London, S.E.7.

2788

CENTRAL ELECTRICITY AUTHORITY

Midlands Division

POWER STATION SUPERINTENDENT is required for Hams Hall "C" Power Station. Superannuable appointment, salary in accordance with N.J.M. Scale 3, £1,575 to £1,725 per annum.

Candidates should have a wide experience in the operation of a large modern high pressure generating station, and should possess sound administrative ability. The possession of a University degree in Engineering or Corporate Membership of the Institution of Electrical and/or Mechanical Engineers will be an advantage.

Apply, quoting Vacancy No. 975.MD on form AE6, available from the Establishments Officer, 53, Wake Green Road, Moseley, Birmingham, 13, by 9th July, 1955. 2863

H. J. CASH & CO. LTD.

Manchester

ELECTRICAL ENGINEER.

Contracting.

Experienced estimating and supervising industrial/commercial installations. State experience, salary, age.

126, Trafford Road, Salford, 5

2793

SURREY EDUCATION COMMITTEE

Wimbledon Technical College, Gladstone Road, London, S.W.19

REQUIRED for September, or as soon as possible thereafter, LECTURER in the ELECTRICAL ENGINEERING DEPARTMENT. He should be an electrical engineer (light or heavy current) capable of teaching to post Higher National Certificate level.

Candidates should be university graduates with good industrial experience as well as teaching experience. Research experience desirable. Salary Burnham Scale for Lecturers (men), £965 × £25 to £1,065 plus London allowance.

Further details from the Principal, to whom completed applications should be sent on or before 1st July. 2791

THE PARSONS AND MARINE ENGINEERING TURBINE RESEARCH AND DEVELOPMENT ASSOCIATION

has two vacancies for

RESEARCH ENGINEERS

with engineering degree or equivalent, for interesting and varied work on full-scale trials of prototype steam machinery installations. Duties include the planning of trials, analysis of results and the writing of reports. Experience of steam plant operation is desirable but not essential. Salaries compare favourably with the Scientific Civil Service and there are superannuation and other benefits.

Applications in writing, stating age and experience, should be addressed to the Research Director, Pametrada Research Station, Wallsend, Northumberland. 2867

ELECTRICITY SUPPLY BOARD, IRELAND

Vacancies for Technicians, Classes I and II

APPLICANTS should have a sound knowledge of automatic telephone exchanges, carrier telephony and/or teleprinters.

The rates of pay for Technicians, Classes I and II, are 4s. to 4s. 5d. and 3s. 8½d. to 4s. 0½d. per hour respectively, according to experience and technical qualifications, for a 44-hour week.

Applications, stating age, qualifications and details of experience, should reach the Personnel Officer, 27, Lower Fitzwilliam Street, Dublin, before 9th July, 1955.

PATRICK J. DEMPSEY,
Secretary. 2807

MERSEYSIDE AND NORTH WALES ELECTRICITY BOARD

FOURTH ASSISTANT ENGINEER (Buildings) required in the No. 4 Sub-Area of the Board, Electricity House, Rhostyllen, near Wrexham. Salary £675/£720 p.a. (N.J.B. K/13).

Applicants should have had experience of design and detail drawing of various architectural and civil engineering works, specification writing, estimating, surveying and levelling, and supervision of site work.

The appointment is superannuable and subject to medical examination.

Application forms obtainable from the Manager, above address. Closing date 4th July, 1955. 2808

SALES MANAGER, FRACTIONAL HORSE-POWER MOTORS

CROMPTON PARKINSON Ltd. would be interested to receive applications for an appointment as SALES MANAGER for Fractional Motors. This is an important managerial post requiring a knowledge of the market for, and capabilities of, fractional motors, and preferably experience in sales management functions of market research, forecasting and planning for large-scale quantity production of high-quality machines.

Applications with full particulars of experience and qualifications should be sent to Ref. MD/P, Crompton House, Aldwych, London, W.C.2. 2866

LAURENCE, SCOTT & ELECTROMOTORS LTD.

DRAUGHTSMEN required at our Norwich works for the layout and detailing of medium electric motors and generators, etc. Experience preferred but not essential. Apply to the Secretary. 2837

DRAUGHTSMAN

required for DETAIL WORK on RADIO COMPONENTS. Apply in writing to Personnel Manager, A. H. HUNT (Capacitors) LIMITED, Bendon Valley, Garratt Lane, London, S.W.18. 89

A DESIGN engineer is required by a company in Cardiff manufacturing electrically rotated machinery 1-100 h.p. Applicants should possess minimum qualifications of Higher National Certificate and possess some experience in similar capacity. An attractive commencing salary will be paid and the successful candidate will become a member of an enthusiastic design team. Applications in strictest confidence to—Personnel Officer, Brush Electrical Engineering Co. Ltd., Hopkinson Works, Birchgrove, Cardiff. 2780

A FIRM engaged in the installation and electric motor repair industry requires a technical representative with sound theoretical and practical knowledge. Applications giving detailed particulars to—The Midland Electric Installation Co. Ltd., Cyprus Works, Upper Villiers Street, Wolverhampton. 2868

A LEADING electrical and electronic engineering company in London wishes to fill the following drawing office vacancies: (a) Components draughtsman with O.N.C. standard education and experience in radio or light mechanical engineering; (b) Lighting fittings draughtsman with experience of sheet metal work, lighting design and electrical wiring. For both positions training will be given, and young men with useful but not related experience will be considered. In addition to good starting salaries the company offers excellent staff conditions, pension scheme, canteen, etc. Apply to—Personnel Officer, Century House, Shaftesbury Avenue, London, W.C.2 (Telephone No. Gerrard 7777). 2798

A SKILLED armature winder/fitter for assembly of wide range of electric motors, etc. Must have repair shop experience. Excellent prospects. — Lewis Electric Motors Ltd., Moor Works, Maidenhead, Berks. 2677

A VACANCY occurs for a young man on the clerical staff of an established E.W.F. wholesaler. Applicants should state details of previous experience, if any. The post offers an interesting job to the right man, and applications should be sent to — Bemco Limited, Maidstone House, Berners Street, London, W.1. 2574

ADMIRALTY, London, requires electrical (Order No. Bath 277) and mechanical (Order No. Bath 278) draughtsmen on work associated with aircraft maintenance and repair. British subjects only, at least 21 years old, with practical experience in workshop (preferably apprenticeship) and drawing office. Knowledge of repair of airframes and aero-engines for mechanical posts, and of aircraft electrical installations and maintenance of either radio or electrical and instrument equipment for electrical posts desirable. Salary according to age, quals. and experience within £420-£670 p.a. plus pay supplement £22-£25. Hours 44 p.w. Payment for overtime. Annual leave 24 days rising to 28 days after three years. Posts temporary but prospects of establishment later. Apply, stating age, technical quals. and full details of experience to any Employment Exchange, quoting relevant order number. 2786

ADMIRALTY requires qualified assistant electrical engineers for unestablished appointments in London, Bath and H.M. Dockyards. Candidates must be British subjects, possess university honours degree or equivalent qualifications, and have had at least two years' practical training followed by practical experience in responsible post. Salaries (increases in which are being considered) within range £680 at age 25 to £1,057 (London rates), subject to reduction in Provinces. 3% to 8% addition to salary when required to work 45½ or more hours a week. Special increase of £75 awarded under certain conditions; annual leave 30 days; prospects of establishment. Application forms from M.L.N.S., Technical and Scientific Register (K), 26, King Street, London, S.W.1, quoting D.272/5A. 2794

AN assistant development engineer is required by a company in Cardiff manufacturing cartridge fuse-links. Applicants must possess O.N.C. as a minimum qualification and have experience in a similar capacity. An attractive commencing salary will be paid. Applications in strictest confidence to — The Personnel Officer, Hopkinson Electric Co., Birchgrove, Cardiff. 2779

APPLICATIONS are invited for a post as laboratory demonstrator in the School of Electronics. A technical qualification equivalent to a Higher National Certificate or Diploma, together with good knowledge of electronics, is essential. The successful candidates will be required to assist with laboratory instruction to students and generally supervise the maintenance and development of the laboratory equipment. Please write for application form giving details of age, experience and qualifications to —Personnel Manager, Automatic Telephone & Electric Co. Ltd., Strowger Works, Liverpool, 7. 2870

ARMATURE winder - chargehand required for supervision of male and female labour on small repairs. Must be experienced AC/DC. The repair shop is situated in the Midlands.—Box 2655.

ASSISTANT commercial engineer required for company of electrical control equipment manufacturers. Must have some knowledge of shipping procedure and be able to deal with correspondence, etc. An electrical engineering background would be an advantage, but is not essential. 5-day week, canteen facilities, pension scheme, etc. Write stating age, experience and salary required to—Personnel Officer, Dewhurst & Partner Limited, Inverness Works, Inverness Road, Hounslow. 2869

ASSISTANT electrical engineer required for work on electrical design applicable to medium capacity control gear. Must have good experience of the application of control equipment as applied to industrial uses. Minimum qualifications H.N.C. standard. Minimum age 28 years. Salary £700/£800 per annum according to age and experience. Permanent and progressive position. West Middlesex area. Housing assistance may be given. Contributory pension scheme. 5-day week. Canteen, etc. Write in confidence, giving full details of age, qualifications and previous experience to—Box 2872.

ASSISTANT to export manager, age 30/40, required by manufacturers of specialist electrical control gear with works 20 miles west of London. Higher National Certificate or equivalent. Ability to handle technical and commercial correspondence and small staff. Good prospects and pension scheme. Commencing salary £850 per annum.—Box 263.

ASSISTANT engineer required for power company distribution department in Malaya. Age 25-30. Grad. I.E.E. or H.N.C. with recognised electrical apprenticeship. Experience should cover L.T. distribution and maintenance, with some knowledge of small diesel generating sets. Salary £980/£56/£1,316 per annum, plus cost-of-living allowance, free passage, quarters and medical attention. Pension scheme. Write—Box E.R.603, c/o 191, Gresham House, London, E.C.2. 2781

ASSISTANT engineers experienced in cable laying, overhead transmission lines and, if possible, general installation work for contractors' offices Midlands and South. Possibility of transfer abroad later.—Box 2711.

ASSISTANT estimator required by manufacturers of MV metalclad switchgear; previous technical and practical experience desirable. Write giving details of previous experience, any technical qualifications and salary required to—Ottermill Switchgear Ltd., Ottery St. Mary, Devon. 2729

ASSISTANT for works office. Young man required by telephone manufacturers for clerical work in works office, some experience similar trades an advantage but not essential. —Box 2765.

BILL SWITCHGEAR, Perry Barr, Birmingham, invite applications for the position of senior design draughtsman. Must have a wide experience in the design and development of L.T. distribution gear and/or electrical accessories and be capable of originating and developing ideas. Permanent pensionable position. Applications in writing to — Chief Draughtsman. 2669

BRITISH PETROLEUM CHEMICALS Limited, Grangemouth, invite applications for the post of electrical engineer. Candidates should be in the age group 30 to 40 years, and must have minimum qualification of A.M.I.E.E., works trained with experience in the installation, maintenance and construction of switchgear, distribution networks, transformers, electric motors, lighting installations, etc., associated with industrial installations operating at 3.3 kV and 440 volts with a demand of some 10,000 kW. The post is progressive in a growing organisation. Rented accommodation can be made available and a non-contributory pension scheme is in operation. Commencing salary will be dependent on background and age. Replies to—B.P.C., Bo'ness Road, Grangemouth. 2705

BRUSH ELECTRICAL ENGINEERING Co. Ltd., Loughborough, Leics., have vacancies for research engineers to assist with advanced projects connected with the development of electrical machines. Men interested in servo-mechanisms, ventilation, insulation, mechanical design or associated technologies are invited to apply. Candidates should possess a good degree in electrical or mechanical engineering, have previous experience of research or development, and be prepared for further study. Conditions of service include non-contributory staff assurance scheme. Please apply with full details to — Chief Personnel Officer, Brush Electrical Engineering Co. Ltd., Loughborough, Leics. 2769

CAPABLE estimator required by leading cable manufacturers. Good opportunity for a young man with some basic cable knowledge; full training will be given to suitable applicant. The company have an excellent pension scheme, full sickness and accident benefits and social and athletic club amenities. Expenses paid to applicants selected for interview.—Box 2826.

CHIEF technical manager required by Ashdowns Ltd., St. Helens, Lancashire, who are a company manufacturing plastics and who are part of the Pilkington Group. Amongst other operations, Ashdowns manufacture laminated sheet for electrical insulation, gears, bearings, etc., form thermoplastic sheet, and produce resin fibreglass laminates by a variety of processes and for a variety of purposes. The successful candidate will be responsible to the managing director for the investigation and development of all new processes and for all technical services. Applicants must be the possessor of a good scientific degree and must have had experience relating to the plastics industry. This is a senior position within the company, offering good prospects. A contributory pension fund is in operation. Applicants should write giving full details of age, qualifications and experience to—The Secretary, Ashdowns Ltd., St. Helens, Lancashire. 2829

CHEMIST required by electrical manufacturers for development work. Should have experience on surface coatings and insulation compounds as used in wire and cable industry. Our staff are advised of this vacancy. Location E. London. Write experience, qualifications, present salary.—Box 2678.

CONTRACTORS, old established, London, W.C.2, medium size with 1st grade clientele, invite applications from engineers, capable of designing, estimating and supervising electrical installations of all descriptions, for post offering good prospects and salary. Write full details.—Box 2634.

CROMPTON PARKINSON Ltd. require both senior and junior draughtsmen at their Chelmsford works. Applicants should have either contract, development or diagram experience on switchgear up to 11 kV, although men with general electrical or mechanical experience will be considered. Ideal terms of employment. Apply, giving full particulars, to the Personnel Officer. 302

DESIGNER required for development of small electro-mechanical devices embodying magnetics and hydraulics. A sound knowledge of tooling methods and design for production is essential. Emphasis is laid upon the possession of practical experience and initiative rather than high academic achievement. S.E. London area. A substantial salary will be paid to the successful applicant. Reply fully in strict confidence, stating age and experience, to —Box 2847.

DESIGNER required having experience of rural and small distribution transformers. Write stating age and experience to — Chief Engineer, Hackbridge and Hewittic Electric Co. Ltd., Walton-on-Thames, Surrey. 2555

DESIGNER required with experience particularly of small mechanisms. Electrical qualifications desirable, excellent prospects. Applications in confidence, stating experience, age and salary required, to—Managing Director, Wandsworth Electrical Manufacturing Co. Ltd., Albert Drive, Sheerwater, Woking, Surrey. 2626

DRAUGHTSMAN required for design and development of electrical cooking and heating equipment for special applications. Some experience of electrical installation work an advantage. West London area. Apply stating age, experience and salary required to —Box 2818.

DRAUGHTSMEN required at the Blackheath (Birmingham) works of the British Thomson-Houston Co. Ltd. for layout and detailing of medium electric motors and generators. Experience in this class of work preferred but not essential. Apply—Chief Draughtsman, Motor Drawing Office, British Thomson-Houston Co. Ltd., Rugby. 297

DRAUGHTSMEN required electro-mechanical work of varied nature, knowledge of circuitry an advantage but not essential. Salary in accordance with age and experience. Pension scheme. Write, giving details of experience, etc. (quoting ref. STK9), The General Electric Co. Ltd., Union Works, East Lane, Wembley. 2885

DRAUGHTSMEN required. Seniors and juniors. For design and detail work on medium voltage electrical switchgear or control gear. Scope for advancement for men showing initiative and enthusiasm. Five-day week. Canteen. Contributory superannuation. Good salaries to experienced men. Interview expenses paid. Apply in writing, stating age, experience and other pertinent details, to—Secretary, M. & C. Switchgear Ltd., Kirkintilloch, Glasgow. 2873

ELECTRIC motor designer required, having experience of A.C. motors, medium voltage, from 5 to 100 h.p. Knowledge of flameproof requirements and experience of high-tension motors an advantage but not essential. Apply, stating age, experience, technical qualifications and salary required, to — "Motor Designer," British Jeffrey-Diamond Ltd., Stennard Works, Wakefield. 2597

ELECTRICAL engineer. Large mechanical engineering firm, near Birmingham, requires electrical engineer to assist in the application of electrical drives and control systems to the company's products. Apprenticeship, drawing office experience and Higher National Certificate desirable. Age 21 to 30 years. Apply, stating age, experience and giving details of qualifications, to—Box 2874.

ELECTRICAL buyer required for London office of merchant company operating in Africa and the Middle East. Must be familiar with installation materials and equipment and have had experience with electrical contractor or wholesaler. Some technical knowledge and experience with radio and domestic appliances would be added advantage. Commencing salary £800. Reply to Box No. 8831, c/o Charles Barker & Sons Ltd., 31, Budge Row, London, E.C.4, giving age, present salary, qualifications and brief summary of experience. 2816

ELECTRICAL draughtsman. The Bahrain Petroleum Company Limited requires the services of an electrical draughtsman for an engineering office at a large oil refinery in the Persian Gulf. Work involved includes layouts for extensions to overhead and underground distribution systems up to 11 kV and power, lighting and control schemes for industrial and domestic installations. Applicants must have served a recognised apprenticeship and should be capable of preparing final installation drawings and bills of material. Age should be between 25 and 35. Technical qualifications up to H.N.C. standard would be an advantage. Commencing salary is £780 p.a. upwards according to qualifications and experience, with free housing, adequate living allowance and medical attention. Periods of service two years each with paid local and home leaves. A kit allowance is provided and participation in the company pension plan. Apply with full particulars to—Box 2679.

ELECTRICAL draughtsman wanted for progressive position in drawing office. Capable of working on own initiative on electrical switchboards, etc. Salary according to qualifications.—Varilectric Ltd., No. 8 Building, 10, Melon Rd., Peckham, London, S.E.15. 192

ELECTRICAL engineer. Large oil company requires young qualified bachelor for service in Middle East. Substantial basic salary with allowances, pensionable service, good prospects, paid home leave. Write quoting No. 526 to—Box No. 8838, c/o Charles Barker & Sons Ltd., 31, Budge Row, London, E.C.4. 2828

ELECTRICAL engineer required for works 20 miles West of London for design and preparation of automatic control gear schemes. H.N.C. or equivalent and ability to handle technical correspondence. Prospects of promotion and pension scheme. Salary according to experience.—Box 214.

ELECTRICAL engineering draughtsmen required by a firm of engineers and contractors on Tees-side for complete electrical installation, design, including motor application, control scheme engineering, distribution and cabling. Experience of contract work and estimating an advantage. Apply stating age, experience and salary required, quoting reference "W," to—Box 55.

ELECTRICAL maintenance engineer wanted by large industrial concern in British East Africa. Should have served a recognised apprenticeship; must be able to take responsibility for maintenance and installation of new equipment. Preference given to men in the age group 23/30 years. Four-year tour with four months' paid leave. Free passages. Superannuation and medical benefits. Salary commensurate with experience and qualifications. Write — Box JN/85, c/o 95, Bishopsgate, London, E.C.2. 2817

ELECTRICAL mechanics, O.N.C. standard, required for training in the installation and maintenance of X-ray and scientific equipment. Opportunity to acquire experience in high-voltage engineering and electronics. Good prospects for advancement. Ability to drive car an advantage but not essential. Details of past experience, etc., should be addressed to—The Personnel Officer, Philips Balham Works Ltd., 45, Nightingale Lane, Balham, London, S.W.12. 2830

ELECTRICIAN wanted. Must be indentured and T.U. Top rates paid. Write in first instance to — Personnel Department, Messrs. Tate & Lyle Ltd., Plaistow Wharf, London, E.16. 2819

ELECTRONIC/electrical engineer required by London manufacturers of radio components to take charge of measurements laboratory and test gear design. Experience of measurements either capacitors, inductors or telecommunication cables an advantage. Salary range £750 to £900. Company rapidly expanding. Write details of experience, qualifications, age and present salary.—Box 264.

ELECTRICIANS. G. R. Marson Limited, 110-116, Queen Victoria Road, Coventry, require a number of electricians for long-term contracts. 2557

ELECTRICIANS required with experience on all types of installation work for work in this country and abroad.—Box 2708.

ENGINEER with electrical or physicist degree required for development work on testing equipment for telecommunication cables. Permanent and pensionable position at salary commensurate with experience and qualifications. Please apply giving full particulars to—Personnel Officer, Southern United Telephone Cables Ltd., Dagenham Dock, Essex. 2676

ENGINEER with initiative, Higher National Certificate standard, required to prepare projects and estimates of industrial electric and gas-fired furnaces. Apply in writing, giving age, qualifications and experience, to—Personnel Officer (P. & E.), Birlec Limited, Tyburn Road, Birmingham, 24. 2875

ENGINEERS required for circuit design work in connection with automatic telephone exchange systems. Applicants should be thoroughly conversant with automatic switching and preferably should have had previous experience in circuit design work. Salary according to age and experience. Write stating age, qualifications and experience to the Personnel Officer, Ericsson Telephones Limited, Beeston, Nottingham, quoting reference DA/3. 2728

ESTIMATING and contracts engineer required for electrical contractors in London area doing lighting and power work throughout the Country. Man accustomed to handling contracts from tendering to invoicing. Apply giving age, qualifications, experience and salary required to—Box 2823.

ESTIMATING engineer for industrial electric control gear. Interesting work on automation and related schemes. Good salary and bonus. Reply stating experience, age and qualifications to—The Donovan Electrical Co. Ltd., Northcote Road, Stechford, Birmingham (near Outer Circle bus route). 2727

EXECUTIVE required by expanding company in the electrical engineering industry to organise purchasing and delivery to schedule of raw materials and components valued at £300,000 per annum. Applicants must have been thoroughly trained in a large organisation and should preferably be aged 35 or over. Knowledge of the electrical industry is an essential qualification. Location is in new factory near London and housing can be provided. Pension scheme in operation. The post is one with real opportunity in a young enthusiastic team, and the salary will be fully in keeping with the responsibilities. Reply—Box 2815.

EXPERIENCED footmaker/chargehand for electric lamps required immediately. Must be conversant with operator-fed and fully automatic/high-speed machines. Accommodation available. Full details, age, experience, salary required, etc.—Luxram Electric Ltd., Knight Road, Strood, Kent. 2670

FOREMAN linesman required for wood pole distribution scheme in Inverness area. High rates paid. Good conditions. Apply by letter, to—B. French Limited, Pike Mills, Green Street, Kidderminster. 2629

FOREMAN supervisor experienced overhead transmission lines and cable work for contractors working Midlands and Southern England. Possibility of transfer abroad later. Write details, age, experience.—Box 2710.

INDUSTRIAL electronic engineer required, London area, experienced in the application of electronics to variable speed motor control and to industrial control problems generally, including circuit development. Must be willing to travel. Write giving details of age, qualifications, experience and salary desired to—Box 2822.

INDUSTRIAL heating engineers. Vacancies exist on the staff of The General Electric Co. Ltd. at the head office of their sales organisation in Kingsway. Applicants, not over 35 years of age, should have had previous sales experience and be familiar with the preparation of I.H. schemes. Apply in writing, quoting ref. I.H., to—The Staff Manager, Magnet House, Kingsway, London, W.C.2. 2778

LAMPSHADE makers (silk) wanted, splendid opportunity for experienced worker to become manager, write in confidence—Bestshades, 228, Clapham Road, London, S.W.9. 2633

JUNIOR technical estimator required for work on electrical control equipment projects. Must have electrical training to O.N.C. standard and have some knowledge of electric motors and associate control equipment. 5-day week, pension scheme, canteen facilities, etc. Please write, giving details of age, experience, qualifications and salary required, to—Personnel Officer, Dewhurst & Partner Limited, Inverness Works, Inverness Road, Hounslow. 2871

MANAGER required for wholesale electrical and general factors, S.E. London. Progressive position with pension scheme. Full particulars of past experience to—Box 2876.

MIDLANDS representative required for manufacturers of laminated plastics (sheet, tubing, machined parts, etc.). Successful applicant will already be calling upon and have a wide connection among manufacturers of all types of electrical equipment; he will be required to carry our products in addition to his present lines, which must not include laminated plastics. Commission and part car expenses. Full details to—Box 8071.

OVERHEAD linesman, first-class, required by large firm of engineers. 12 months' service overseas. Write, age and experience, to—Box 2623.

OVERHEAD linesmen and mates urgently wanted for contract work in the South and Midlands. Low and high tension. Good hours and rates.—Box 2457.

PERSONAL assistant required for chief large force electricians operating throughout the country. Excellent opening for man who can show ability to lead and a practical sense. Applicants should be under 30 and have a qualification in electrical engineering. Headquarters will be in London. Please give details of education and experience, with an indication of salary required, to—Box 2782.

PERSONNEL required for sales office large electrical wholesalers S.W. London. Canteen facilities, superannuation scheme. Male and female. Apply—Box 2795.

PHILIPS ELECTRICAL Limited require a young man to act as commercial assistant in the industrial division. The department deals with the marketing of rectifiers, capacitors and heavy electrical equipment and the successful applicant will, after training, be engaged on customer liaison and dealing with technical quotations. Essential qualifications are: Age between 25/30 with H.N.C. (Elec.) standard of education and good works experience. Grad. I.E.E. would be an additional qualification. The post is progressive and the company operates a five-day week and full employee benefits. Applications, giving details of age, qualifications and experience, should be addressed to the Personnel Officer, Century House, Shaftesbury Avenue, London, W.C.2, quoting reference T.G.M. 2877

PLUMBER-jointers required for work in this country and abroad. Minimum experience 11-kV jointing.—Box 2709.

POWER requirements increase when a great factory expands. That is why Ford Motor Company Limited, of Dagenham, Essex, have new opportunities for draughtsmen with the right experience. Could you fill one of these vacancies? A mechanical engineering draughtsman, with knowledge of power station work, high-pressure boilers, turbine and ancillary equipment and layout; a man of H.N.C. standard. A senior electrical draughtsman who can prepare drawings for the layout and cabling of power house equipment, substation layouts, electrical networks, schematic diagrams, etc.; capable of taking off quantities and preparation of specifications. A junior electrical draughtsman who has already some experience of these duties. These posts are permanent, and if you are one of the men we are seeking a generous non-contributory pension will follow a salary which has been increased according to your merit. Starting salary will be matched to your experience and qualifications. Are you interested? Then write to our Salaried Personnel Department, quoting reference KPD. 2834

PROGRESSIVE positions offered by well-known company to capable men with experience in electrical wholesaling. Vacancies at Hammersmith, West End and head office near Liverpool Street, London.—Box 2706.

RADIO mechanic, first-class, 12 months overseas, firm engineers. Write full experience, references, age.—Box 2696.

SALES correspondent required by The Telegraph Condenser Co. Ltd., North Acton, London, W.3. Applicants must be experienced in conducting semi-technical correspondence, submitting quotations and generally dealing with customers. Knowledge of electrical/radio industry an advantage but not essential. Superannuation scheme up to 55 years of age. Write giving full details of experience, age and salary required to—Personnel Manager, T.C.C. Ltd., North Acton, London, W.3. 2792

SALES director. Opportunity in the electrical industry for man with experience and a successful record in sales administration to qualify for a seat on the board of a well-known Midland company. Please write sending full details.—Box 2783.

SALES engineer for East Midlands, for sale of E.H.T. and L.T. switchgear, transformers, power factor improvement capacitors, instruments, thermal storage heating installations. H.N.C. essential. Apply—Box 8060.

SALES engineers required by South Wales Switchgear Ltd., Blackwood, Mon. Salary commensurate with responsibilities and housing assistance may be given. Applications stating experience, qualifications, etc., to—Personnel Manager. 2821

SENIOR electrical engineer required by old-established company manufacturing special purpose control gear for multi-motor drives. Applicant should preferably have degree and/or membership of the Institution of Electrical Engineers. Position of high executive status controlling existing staff and responsible to directors. Pension scheme, and housing assistance if required. Write to—Box 2600.

SIEMENS-SCHUCKERT (GT. BRITAIN) Ltd. require electrical and/or mechanical draughtsmen. Apply to—Technical Dept., Siemens-Schuckert (Great Britain) Ltd., Faraday Works, Great West Road, Brentford, Middlesex. 2707

SKILLED overhead linesmen required for wood pole distribution scheme in Inverness area. Good pay and conditions. Apply by letter, to—B. French Limited, Pike Mills, Green Street, Kidderminster. 2630

STOREKEEPERS required for modern warehouse. Large electrical wholesalers S.W. London. Canteen facilities, superannuation scheme. Apply—Box 2796.

S.W. London electrical wholesalers stocking all leading manufacturers' products have vacancies for experienced industrial representatives. Preference given to applicants with existing connection and car owners. Superannuation scheme. Apply in confidence to—Box 2797.

TECHNICAL writer (radar) required by manufacturer in the London area to compile literature on radar equipment. A good general educational and engineering background is necessary, with H.N.C. (including electronics) as the minimum technical standard. The principal requirement, however, is the ability to assimilate information supplied by laboratory technicians and to prepare this in a clear logical sequence suitable for publication as a handbook. Salary will be commensurate with experience and ability, but a minimum of £750 per annum is offered and, for a qualified radar engineer who is able to meet the requirements described above, there is scope beyond the position now vacant. Write, in confidence, giving full particulars of past experience, qualifications, age and salary required to—Box 2776.

TECHNICAL writer to produce technical bulletins and operating instructions (with minimum supervision) dealing with picture telegraph equipment, measuring instruments, magslip and servo components. Degree or H.N.C. desirable with aptitude for this specialised form of writing. Pension scheme. Apply in writing to—Muirhead & Co. Ltd., Beckenham, Kent. 2814

TECHNICAL/commercial engineers and draughtsmen required by motor control gear manufacturers. Pension scheme, 5-day week, pleasant working conditions. Canteen and club. Write giving details of age, experience and training to—The Secretary, The Electrical Apparatus Co. Ltd., St. Albans. 2890

TELEPHONE engineer required for London office. Good circuit knowledge and technical background essential. Write giving full details and salary required.—Box 2661.

TELEPHONE exchange mechanic, first-class, 12 months overseas, excellent opportunity, large company engineers. Write age, experience.—Box 2697.

TELEPHONE maintenance engineers required for Swansea area; also vacancies available for Newport area. Permanent position with pension. Write full details, age, experience. — Reliance Telephone Company, 23, Lawrence Hill, Bristol. 8068

TEST engineers required for type testing and quality testing. Applicants should hold Ordinary National Certificate or exemption. Those taking third year of O.N.C. course would be considered. Superannuation scheme, staff canteen, five-day week. Write giving full details of age, experience and qualifications to—Personnel Department, Rotax Ltd., Chandos Road, Willesden Junction, London, N.W.10. 2680

THE HACKBRIDGE AND HEWITTIC ELECTRIC Co. Ltd., Walton-on-Thames, Surrey, require senior and junior sales and contracts engineers. Previous experience of tendering for rectifiers and transformers desirable but not essential. Five-day week. Canteen facilities. Pension scheme, good salary and prospects. Apply in writing to the above address. 2835

THE QUASI-ARC Company Ltd., Bilston, Staffordshire, requires mechanical and electrical engineers interested in a concentrated course of training in all principal types of manual and automatic arc welding processes and equipment, with a view to taking up technical and technical sales careers at home or overseas. Reply at once to the Secretary, The Quasi-Arc Company Limited, Bilston, Staffordshire, stating age, qualifications and experience. 2848

THE RECORD ELECTRICAL Company Limited have vacancies for development engineers. Previous experience of electrical measuring instruments not essential, but applicants should have initiative and design ability. Apply in confidence, giving experience, age and salary required to—Chief Engineer, The Record Electrical Co. Ltd., Altrincham, Cheshire. 2601

THE Research Laboratories of The General Electric Co. Ltd., North Wembley, Middx., have an opening for a graduate physicist or electrical engineer for experimental work on new prospects in the field of domestic equipment. Men with Higher National Certificate who have had some experience in this field will be considered. Candidates must have completed (or be exempt from) National Service if under 26 years of age. Apply in writing to the Staff Manager (ref. RLO/40), giving full particulars of experience, qualifications and age. 2771

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TRANSFORMER design engineer with sound experience of small electronic transformers, preferably in quantity production, required by company in South of England. Applicant must have initiative, ability to control staff, and ambition to take departmental responsibility. Write, with full details of age, experience and salary required, to—Box 8074.

TRANSFORMER designer for large and medium power transformers. Write giving details and experience to — Chief Engineer, Hackbridge and Hewittic Electric Company Limited, Walton-on-Thames, Surrey. 2554

TRICITY COOKERS Ltd. are expanding their sales force and invite applications from those wishing to represent the company in the area covered by the South Wales Electricity Board. Remuneration by salary and expenses. Optional pension scheme. Initial interview will be arranged in Cardiff for selected applicants. Write to 109, Kingsway, London, W.C.2, giving details of age, education and selling experience, and state whether car owner or driver. 2831

TRICITY COOKERS Ltd. require sales correspondence clerk. Progressive post. Pension scheme. Write, giving age and details of experience, to—109, Kingsway, London, W.C.2. 2878

YOUNG man required for sales office and showroom. Knowledge of electric lighting fittings essential. Please apply to—Fredk. Thomas & Co. Ltd., 18/26, Everton Buildings, Stanhope Street, London, N.W.1 (Eus. 4111). 2628

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E. R.

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WEDNESDAY, 6th JULY, 1955, at 11 a.m.

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Viewing (on site) Monday and Tuesday, 4th and 5th July, 9 to 4.30, and on Sale morning to 11. Catalogue, 6d., admits two for viewing but one only to Sale, from the Auctioneers, HARRISON & HETHERINGTON LTD., Botchergate, Carlisle (Phone 26292/3). 2799

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South Eastern Division

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For forms of tender, lists of equipment and full details regarding location and arrangements for inspection, apply to Divisional Supplies and Stores Officer, Lower Ham Road, Kingston-on-Thames (Telephone No. KINgston 7788, Extension 10).

2849

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2,250-kVA COMPLETE POWER INSTALLATION

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Grams: Ensuplico, Low Fell. 293

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A HIGH-vacuum impregnation unit or single or batch coil impregnation service to RIC Specification 214 or individual requirements.—Blickvac, 96/100, Aldersgate Street, London, E.C.1 (Tel. MONarch 6256/8). 44

A.C. and D.C. house service meters, all sizes, quarterly and prepayment, reconditioned, guaranteed one yr. Repairs and recalibrations.—The Victa Electrical Co., 47, Battersea High Street, S.W.11 (Tel. Battersea 0780). 138

A.C. and D.C. motors, all sizes, large stocks, fully guaranteed. — Milo Engineering Works, Milo Road, East Dulwich, S.E.22 (Forest Hill 2278-9). 102

A.C. and D.C. motors, generators, from stock.—Service Electric Co. Ltd., Honeypot Lane, Stanmore, Middx. (Edgware 5566/9). 91

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ALTERNATORS, 3-phase, all sizes in stock from 7 kVA up to 330 kVA.—Britannia Manufacturing Co. Ltd., 22/26, Britannia Walk, London, N.1 (CLErkenwell 5512). 24

BARGAINS in electric motors are always being obtained from A. Cooksley & Co. Ltd., 21/25, Tabernacle Street, London, E.C.2. Stocks include A.C. and D.C. motors, second-hand and new up to 30 h.p. Starters, slide rails and pulleys. Ring Mon. 3355 for your requirements. 50

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ELECTRICIANS. Send for details Shaftesbury lightweight "Bantam" ladders. Top sections fitted with patent moulded rubber blocks, eliminate possibility of scratching or marking walls, fascias, and other painted or highly polished surfaces. Also available for immediate delivery, steps, platform steps, trestles, telescopic trestles, pole and builders-type ladders, and all sizes of two and three-section extension ladders.—Shaftesbury Ladders Ltd. (E.R.), 453, Katherine Road, London, E.7 (Phone: Grangewood 3363/4). 111

EX W.D. resin bonded paper tube, 7/8″ bore, cheap for quick sale, sample and prices on request.—Philpott's, Fountain Sq., Fenton, Stoke-on-Trent. 8066

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FLUORESCENT fittings and control gear for home and export. Wide range competitively priced. Catalogues from — Rada, 148-150, Curtain Road, London, E.C.2 (Shoreditch 8275, 4 lines). 237

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POLYPHASE kilowatt hour meters. Available from stock.—Universal Electrical, 221, City Road, London, E.C.1. 40

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SLYDLOK fuses, H.R.C. fuses, panel switches.—Ryness Ltd., 124, Manor Way, Boreham Wood, Herts (Elstree 3811). 300

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WARD Leonard motor generator sets, all sizes.—Britannia Manufacturing Co. Ltd., 22-26, Britannia Walk, London, N.1 (Tel. Clerkenwell 5512). 10

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SURPLUS laminations, enamel copper wire, screws, nuts, flex. Good prices paid. Full details to—Box 200.

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WANTED for prompt cash, ferrous and non-ferrous scrap, also plant for dismantling. Buyers of secondhand machinery and plant for re-use.—W. & H. Cooper Ltd., 176, Brady St., Bethnal Green, London, E.1. 120

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WANTED, surplus stocks cable, all types and sizes. We can inspect.—Box 220.

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A.C. and D.C. motor rewinds and repairs. Prompt service, fully guaranteed.—Edgware 5566/9; Service Electric Co. Ltd., Honeypot Lane, Stanmore, Middx. 92

INDUSTRIAL and domestic motor rewinds and repairs speedily carried out. All work guaranteed.—N. France, Electronics Ltd., 110, New Road Side, Horsforth, Leeds (Horsforth 2871). 294

METALWORK. All types cabinets, chassis, racks, etc., to your own specifications. Write—Dept. 'S,' Philpott's Metal Works Ltd., Chapman Street, Loughborough. 211

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MISCELLANEOUS

ARON ELECTRICITY METER LIMITED

NOTICE is hereby given that the Transfer Books and Register of Members of the Company will be closed from the 7th to the 16th of July, 1955, both days inclusive.

By order of the Board.
H. L. W. ALDRIDGE,
Secretary.

72a, Salusbury Road,
Kilburn, London, N.W.6. 2803

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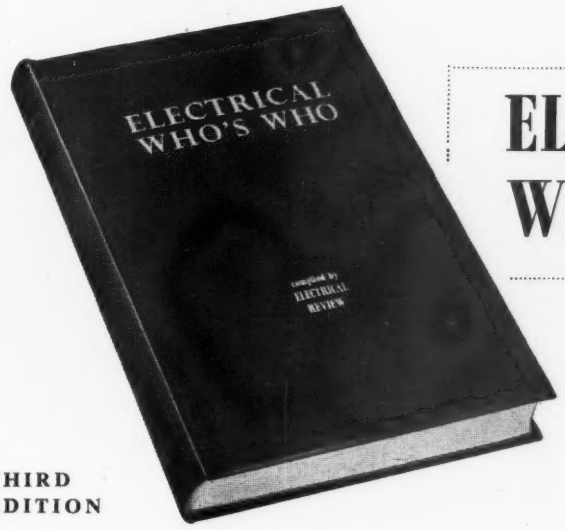

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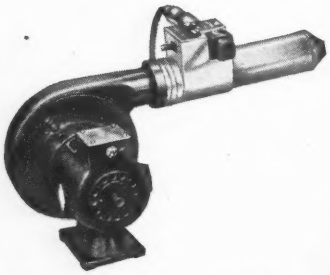

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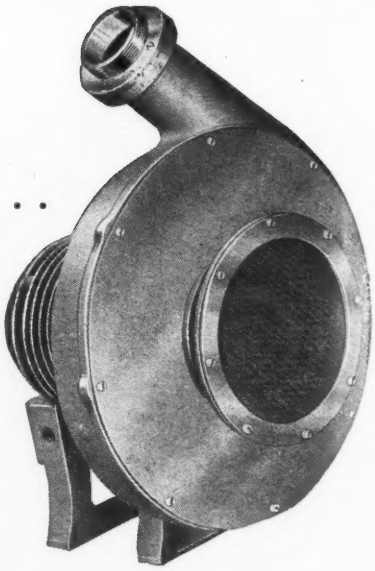

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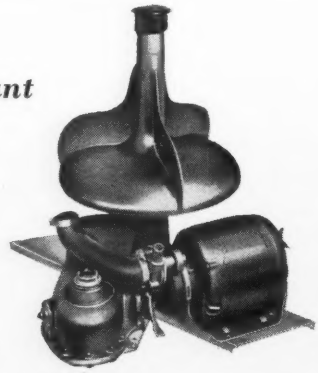

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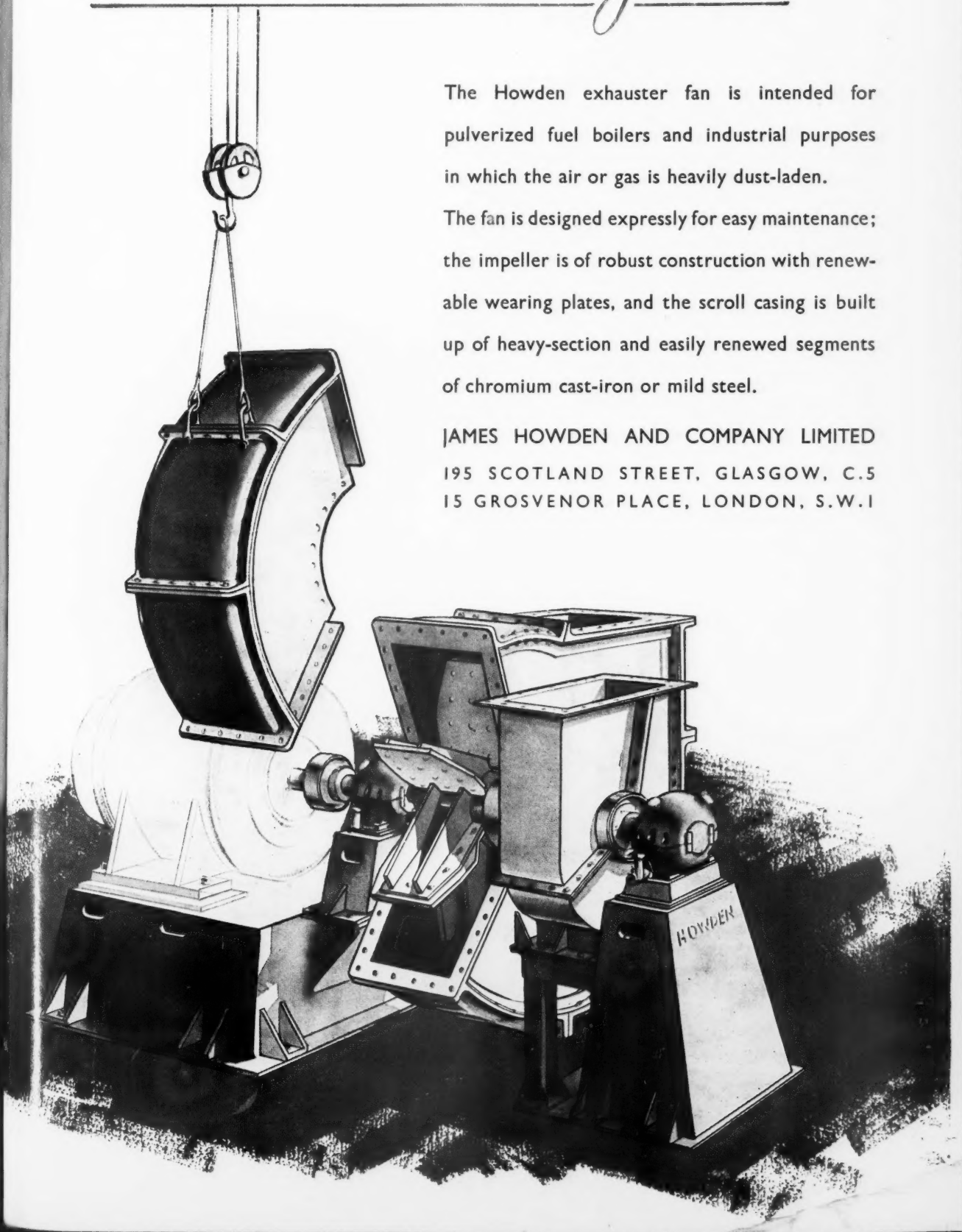

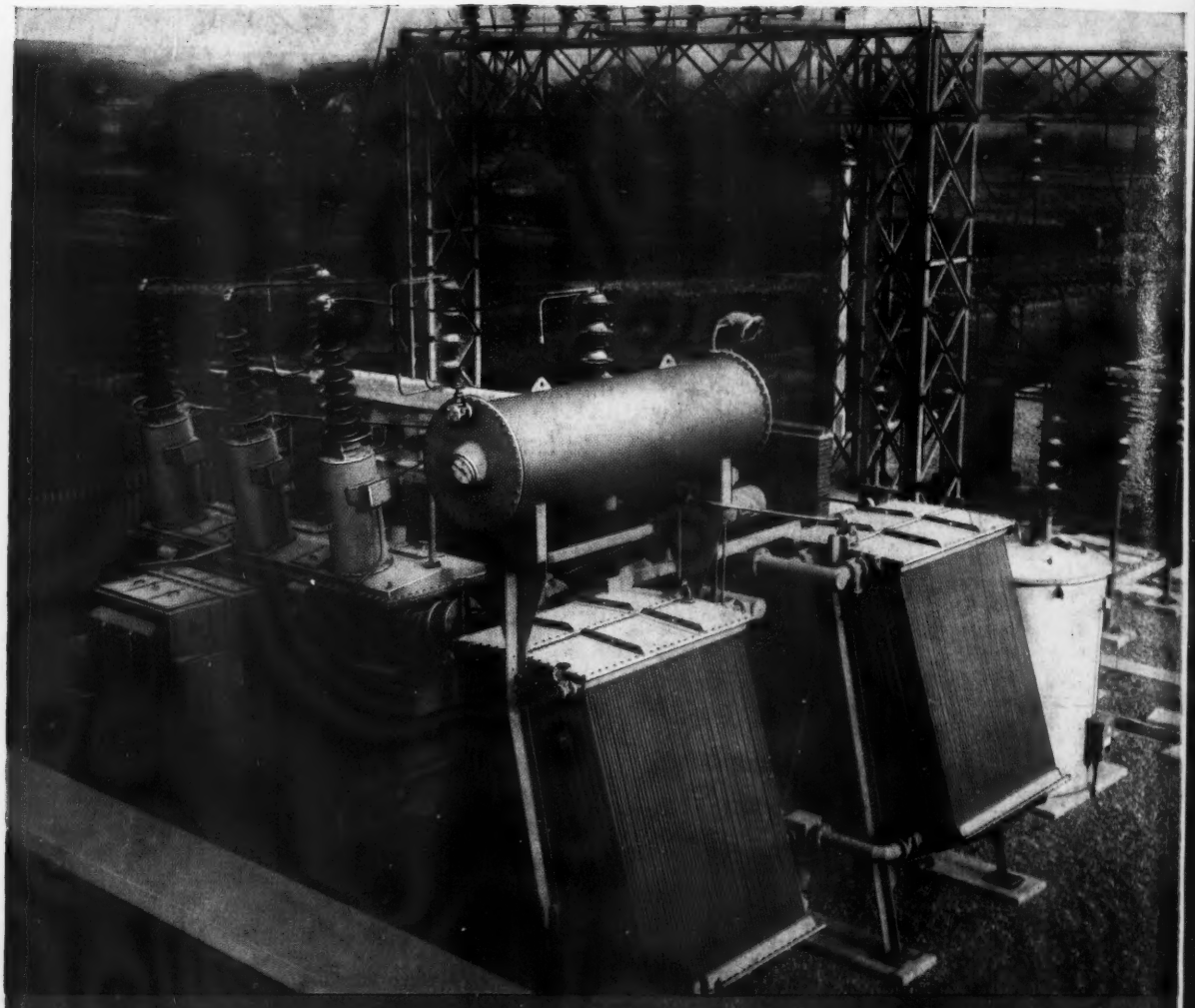

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